NETWORK WORLD

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Price is right for new Notes

BY ADAM GAFFIN

Orlando, Fla.

Lotus Development Corp. went on a Notes rampage last week, announcing price cuts and new tools aimed at meeting user demands and cutting Microsoft Corp. off at the groupware pass.

Lotus President Jim Manzi said his goal is to increase the number of Notes desktops from 1.3 million to 20 million by the end of 1997.

Company officials said they can achieve this in part by helping users reduce operating costs — through such offerings as a $155 run-time version of Notes and a new management program introduced at the Lotusphere user and developer conference here.

"This is a deliberate, calculated, preemptive strike against Microsoft's entry with Exchange, whenever the hell that might be," said Jeff Papows, vice president of Lotus' communications business.

See **Notes**, *page 57*

NetView for AIX to go distributed

BY MICHAEL COONEY AND JIM DUFFY

Washington, D.C.

IBM will give users a powerful new tool for managing enterprise networks when it begins shipping next month beta copies of its new NetView for AIX management platform that supports distributed management databases and SNMP Version 2.

Sources familiar with IBM's plans said NetView for AIX Version 3.2 will include the ability to distribute management databases among multiple workstations to enhance performance and availability. It also will feature improved security capabilities, device discovery features and event synchronization attributes.

The new version is designed to improve the scalability of the platform, enable it to better manage bigger environments and push IBM to the forefront of the enterprise net management arena.

"NetView 3.2 will put IBM far ahead of HP — especially now that Tornado's delayed — and give it more scalable functionality than SunSoft's SunNet Manager," said Jill Huntington-Lee, principal analyst at Brandywine Network Associates in Cinnaminson, N.J. "For users looking to manage large enterprise systems, IBM will look pretty good."

HP last week revealed that its distributed version of OpenView, known as Tornado, would be delayed as much as a year (*NW*, Jan. 23, page 1).

With NetView for AIX 3.2, it

See **NetView**, *page 56*

WALTER CALAHAN

IBM's Granatino details his firm's campus ATM switching blueprint. Page 6.

Are users safe doing business on the 'Net?

Feds issue warning about IP spoofing — and detail preventive measures.

Spooking the spoofers

- Don't rely on IP address-based authentication; use encryption-based authentication and dynamic password control.
- Install an Internet firewall capable of reverse address resolution, under which a packet's IP source address can be checked against the physical location of the computer it came from.

BY ELLEN MESSMER

Pittsburgh

Reports of network break-ins based on an insidious type of attack called IP spoofing again has ignited controversy over the safety of the Internet for corporate use.

Last week, the Computer Emergency Response Team (CERT), a federally funded organization that monitors security events, issued an advisory alerting network managers to guard against IP spoofing. The warning followed the first report — by a San Diego Supercomputer Center researcher whose computer was recently ransacked — of such an incident.

The issue heightened user fears about utilizing the Internet for business purposes, such as electronic commerce. Some companies that have already embarked on that course spent much of the week trying to quell user concerns, while others said the incident has them proceeding with extreme caution.

With IP spoofing, a hacker forges an IP source address, using one that is authorized, or "trusted," to access the target computer. This type of information can be obtained easily by monitoring network traffic to determine relationships of trust.

"There's lots of freeware on the Internet to do this," said Dan Geer, chief scientist at Pleasanton, Calif.-based consultancy OpenVision.

Using a trusted IP address, the attacker opens the connection to the target computer by guessing in advance the initialization sequence

See **Internet**, *page 8*

PROFILE

For Compaq, server dominance just isn't enough

BY MARGARET DORNBUSCH

Houston

Not content to rest on its laurels as the leading server manufacturer, Compaq Computer Corp. this year plans a series of product rollouts and enhancements that amount to an all-out assault on the enterprise network market.

Server shopping means bottleneck bopping. Buyer's Guide explains why. Page 33.

The cornerstone of the plan involves integrating such key net components as hubs, routers and remote LAN access systems into Compaq's single-processor and multiprocessor servers. Compaq will build on that by bringing all these technologies under the auspices of its Insight Manager management software and offering clustering capabilities that let users strap servers together to handle increasingly complex client/server computing chores.

See **Compaq**, *page 56*

Client/server convert takes back control of its network

BY MARGARET DORNBUSCH

St. Peters, Mo.

The task of downsizing from a mainframe environment to a client/server one is often so daunting that companies wind up outsourcing the job. MEMC Electronics Materials, Inc., however, took exactly the opposite route.

The company, which supplies silicon wafers for IBM, Motorola, Inc. and other chip makers, celebrated last July 4 by saying good-bye to the outsourcing company that ran its mainframe and cutting over a new homegrown client/server system.

MEMC decided to go with client/server to save money and improve customer service, said Gary Kalbfleisch, MEMC's director of information services.

Client/server payoffs

- Saves $70,000 a month on order processing.
- Reduces time to respond to customer order changes from weeks to hours.
- Eliminates system downtime.
- Helps company generate record revenues.

Since the switch, MEMC has cut spending on order processing from $100,000 to $30,000 per month, despite adding two Unix gurus and leasing all new equipment. Also, response times to customer inquiries have been sliced from weeks to hours, downtime has evaporated and the company has set sales records almost every month.

"We minimize [customer order] changeovers and don't have expensive [manufacturing] machines sitting idle," thanks to the new client/server system, Kalbfleisch said.

The need to change from the mainframe environment became apparent in 1989 after MEMC, then a division of Monsanto, was

See **Client/server**, *page 55*

Our remote control roundup finds four products that need a bit of refining. Page 40.

Briefs

NRC makes LAN switch plunge. Network Resources Corp. (NRC) will make its foray into the Ethernet switching market next week when it announces a stackable switching hub with management and routing capabilities. The 12-port MultiGate Switch will support both shared and switched Ethernet workgroups, as well as high-speed backbone uplinks via Asynchronous Transfer Mode, Fiber Distributed Data Interface and other technologies. Pricing for the switch, which is available now, starts at $7,995.

NRC: (408) 383-9300.

High-speed international dial-up. The SITA Group, provider of global network services to airlines, hotels and other businesses, last week unveiled an analog dial-up service designed to carry international traffic at 28.8K bit/sec. The new High Speed Dial Access Service enables users with V.34 modems to access SITA's global X.25 backbone for error-free file transfers, remote LAN access and other applications.

SITA: (404) 850-4500.

Well, well, WELL. Two more Internet providers have jumped onto the World-Wide Web bandwagon. The WELL offers a roll-your-own Web service that starts at $20 a month for 2M bytes of disk space. USWeb of Albany, N.Y., charges $2,500 a year to host documents on its Web server. The fee includes 10M bytes of disk space and a Web authoring kit.

USWeb: (315) 433-0022; The WELL: (415) 332-4335.

Bright management future. SunSoft, Inc. is expected to announce its intention to aggressively compete in the integrated net and systems management arena this week when it rolls out a scalable platform offering capped off by the Solstice Enterprise Manager, formerly Project Encompass. SunSoft will also unveil a wide array of systems management applications that can run on Solstice. Cisco Systems, Inc. and LEGENT Corp. are expected to endorse the SunSoft initiative at a press conference today in New York.

Europe opens up. Cable & Wireless PLC, a British telecommunications company, and Veba AG, a German conglomorate, last week announced plans to invest $6.37 billion over five years in a joint Europe-wide telecommunications business.

Exact plans for the alliance were uncertain, but the agreement parallels alliances between BT and MCI Communications Corp.; France Telecom, Deutsche Telekom and Sprint Corp.; and AT&T and Unisource. All are seen as attempts to gain shares of the European market as European Union agreements begin to lift restrictions that made pan-European telecommunications networking difficult.

Taking Action. Action Technologies, Inc. last week rolled out software to bring workflow technology to document management applications. Its ActionWorkflow DocRoute lets users create routing and notification rules for documents. The software complies with the Open Document Management application program interface and initially works with document management applications from Novell, Inc.'s SoftSolutions division, PC Docs, Inc. and Saros Corp. Pricing starts at $195 per user and $2,495 per server.

Action: (510) 521-6190.

Humming along with Windows NT. Hummingbird Communications, Ltd. of Markham, Ontario, next week will release new X Window System connectivity software — Exceed 4 for Windows NT 4.1. The software enables users of Windows NT Workstation Edition running on a variety of hardware platforms to access Unix, VMS and other X Window Systems. It costs $545 for a single copy, with site licensing available.

Hummingbird: (905) 470-1203.

Fax about Cheyenne. Cheyenne Communications, Inc. next month will unveil a new version of its Novell, Inc. NetWare-based fax server software. Faxserve 2.0 will work with NetWare Directory Services and the NetWare Administration utility to give users one point of administration and access to Faxserve. It also will add support for intelligent fax boards.

Cheyenne: (516) 484-3446.

For details on how to reach us, see page 58.

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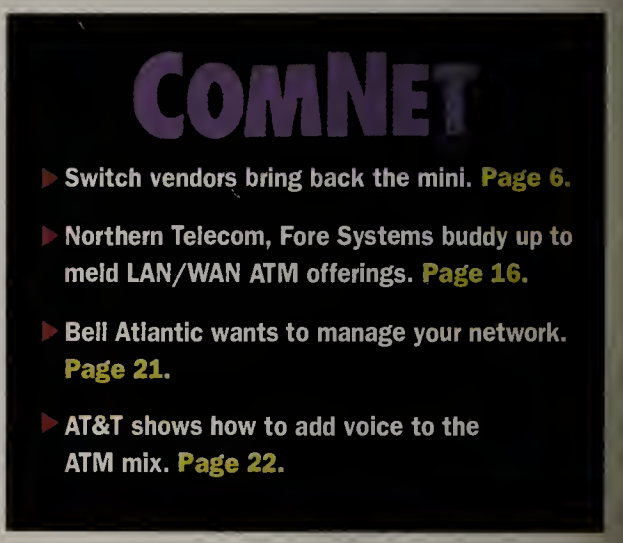

Network HELP desk

Network World tracks down answers to your questions regarding products, services, technologies or disputes with vendors. Please submit questions to Alison Conliffe via phone at (800) 622-1108, via fax at (508) 820-1103 or (508) 820-3467, via the Internet at aconliff@world.std.com or via CompuServe at 75471,2725.

I am an MIS system manager for Puerto Rico's Department of the Treasury, which is similar to the U.S. Internal Revenue Service. We have a Novell, Inc. NetWare 3.11 250-user system running on a NetFrame Corp. NF450FT, but are planning to extend support to 4,000 users in the future.

We have looked at various operating systems and have settled on two: Microsoft Corp.'s Windows NT Advanced Server (NTAS) and IBM's OS/2 Warp. Can you give us a thumbnail comparison between the two so that we can settle on one? Also, are you aware of any documents that compare them in great detail?

Luis Diaz Vega, Bayamon, Puerto Rico

Robbin Young, managing editor of "Windows Watcher," an industry newsletter based in Redmond, Wash., says:

A complete analysis of OS/2 Warp vs. Windows NTAS is a huge undertaking. However, I think the key thing you need to weigh is the kind of support, connectivity and upgradability you can expect from each system and vendor, not to mention the availability of applications.

On those terms, Microsoft has a dominant position in the market, a growing network of support partners and is building momentum in the large-scale systems market. But the scale of the situation you describe does fit well with IBM's traditional area of expertise.

Speaking of scale, I am surprised to see that you are evaluating NTAS vs. Warp. Windows NT is more of a server system, so on the OS/2 side, I think you really should be looking at one of the higher end products in the family, such as the Enterprise edition. Most people compare OS/2 to the pending Windows 95, and OS/2 compares quite favorably on that level.

I recommend you read an article written for *Windows Sources* by Randall Kennedy called "NT fends off OS/2 Enterprise." He does an excellent job of outlining the key points of difference

See **Help desk,** *page 44*

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Group seeking open mgmt. tools loses key members

BY JIM DUFFY

Washington, D.C.

Four leading network management vendors have withdrawn from the Management Integration Consortium (MIC), stalling a previously unified effort to develop an open management data repository.

In a letter to MIC Chairman Jim Corrigan dated Jan. 17, IBM, Hewlett-Packard Co., SunSoft, Inc. and Digital Equipment Corp. expressed a lack of confidence in the organizational and operational practices of MIC and stated that there are "some major obstacles that will prohibit" the group's success.

The vendors also stated that while they believe MIC's mission — to create an open data repository for management information and consistent interfaces for accessing and sharing that data — addresses a need in the industry, other organizations are "better equipped" to tackle such issues and move them forward for standardization.

The letter was signed by William Warner, vice president of enterprise management for IBM's Network Software Division; Bob Emerson, business manager for telecommunications and common platforms in HP's Network and Systems Management Division; Denis Yaro, vice president and general manager for Enterprise Management Products at SunSoft; and Diane Stewart, manager of Network and Systems Management at Digital.

Users said MIC's goal was lofty from the outset and the withdrawal of the major platform vendors will not help.

"It's an effort that has had an uphill struggle, and this just makes it more difficult," said Rick Sturm, a member of the technical staff at US WEST Advanced Technologies in Boulder, Colo. "They had difficult challenges, both technically and in terms of acceptance."

Frank Belland, senior communications consultant at Martin Marietta Corp. in Orlando, Fla., was also concerned. "This framework grenade says the vendors want to stay with their own proprietary structures," he said.

MIC participants plan to release data repository storage and access software in the third quarter. Today, vendors' repositories are proprietary to their own platforms.

In the letter, the vendors cited four areas they considered obstacles to the MIC's success:

- Gaps in the group's bylaws that leave many operating procedures vague.
- Poor coordination among MIC working groups.
- Failure to adequately position MIC vis-a-vis other consortia and standards bodies, such as X/Open Company, Ltd., the Network Management Forum and the Object Management Group.
- Failure to spell out who would market MIC products and own intellectual property

See **Group**, *page 56*

StarWare offering to help Windows users reach DB2

BY BARB COLE

Berkeley, Calif.

StarWare, Inc. this week will roll out an Open Database Connectivity (ODBC) driver that links Windows applications to IBM DB2 databases on mainframe, mid-range and Unix platforms.

StarSQL, essentially a middleware package, lets end users bring record-by-record information from IBM DB2 databases into any ODBC-enabled front-end application.

The software works with IBM's Distributed Relational Database Architecture (DRDA), eliminating the need for special software on the DB2 host machine and ensuring compatibility with IBM hardware and software releases, according to StarWare President Jim Mullen.

Joe Correira, vice president of information engineering at Travelers Insurance Co. in Hartford, Conn., said StarSQL could provide an efficient way to give end users access to DB2 data.

"Currently, we write calls to a CICS program and have CICS do the database read and pass the data back to the end user," he said.

StarSQL can provide an end user with simultaneous access to remote and local DB2 databases, and can also give multiple users concurrent access to the same database.

The client-based software runs on Windows and Windows for Workgroups clients. It converts ODBC calls into the DRDA format and runs over Systems Network Architecture links. It supports SNA servers from Microsoft Corp. and Novell, Inc.

While the software currently works only with DB2, it will support databases from Oracle Corp., Sybase, Inc. and Informix Software, Inc. in later releases, according to Mullen.

Analysts said there is at least one other product — Wall Data, Inc.'s Rumba for DRDA — that offers Windows client applications direct access to IBM databases via DRDA. However, StarSQL costs less.

Available now, StarSQL costs $89 per user for a 10-user license, $69 per user for a 100-user license and $49 per user for 1,000 users. Rumba for DRDA costs $1,000 for an administrator's license, plus $295 to $495 per user, depending on the server (but the price can fall as low as $150 per client when bundled with other products).

©StarWare: (510) 704-2001.

Company miniprofile

Based: Berkeley, Calif.

Founded: 1992

Employees: 20

Ownership: Privately held

Primary products: Star5250, a Unix-based 5250 terminal emulator; StarTools, a utility for bidirectional file transfer, remote commands and print spooling between Unix and mid-range computers; and StarMail, a gateway between UnixMail and IBM OfficeVision.

Key competitors: Wall Data and Attachmate

LOCAL PHONE COMPETITION

NYNEX signs local access pact

BY TIM GREENE

New York

NYNEX Corp. and MFS Intelenet, Inc. have reached an interconnection agreement that gives MFS better footing to compete in the New York local phone market and could serve as a model for agreements in other markets.

Under the agreement, NYNEX will pay MFS for completing calls from NYNEX customers to MFS customers, and vice versa. Previously, only MFS paid to have calls completed and at a rate close to NYNEX's retail rate per call. The new rate is 48% of retail.

NYNEX will now charge a much lower rate to let customers keep their NYNEX-issued phone numbers when they switch over to MFS local service. The charge was reduced from $70 to $75 per month down to $4 per month, according to Royce Holland, president of MFS.

Holland said MFS has offered local service in parts of New York state for 18 months but had to pay so much to NYNEX for interconnecting that it only made a profit on its long-distance service. The financial structure of the new agreement allows for a profit on local service, he said.

More competition is good news for users, according to Scott Matluck, treasurer of Communications Managers Association (CMA), representing about 200 businesses in the Greater New York area.

"Competition is always in our best interest for two reasons," Matluck said. "One, for price, and two, if nothing else, it lets NYNEX and any other operating company know that the level of service they provided in the past has to be met or exceeded."

"It should give people in business a lot of

See **NYNEX**, *page 57*

Fight card

New interconnection agreement with NYNEX gives MFS a better chance to compete in these New York areas:

- Albany
- Buffalo
- New York City (except Staten Island)
- Westchester County

In April, MFS hopes to compete in Boston.

Novell readies enhancements for NetWare for SAA

BY KEVIN FOGARTY

Provo, Utah

Novell, Inc. next month will announce enhancements to its NetWare for SAA mainframe connectivity product that will improve performance, manageability and administration.

NetWare for SAA 2.0, the first major enhancement to the 4-year-old product, will include better Downstream Physical Unit (DSPU) support, load balancing, a NetWare 4.1 run-time version, and will be bundled with Novell's NetWare for SAA Services Manager management application, according to beta users and Novell officials.

The new version will support as many as 2,000 concurrent sessions and the tn3270 protocol, and will integrate with Novell's NetWare Administration (NWAdmin) and NetWare Directory Services (NDS) to let users centrally administer and track users, as well as network resources. It will also include a hot backup feature that will switch traffic automatically from a downed server to an alternate device (*NW*, Nov. 21, 1994, page 4).

The DSPU support will allow network administrators to leave their 3270 terminals attached to existing 3174 cluster controllers and route that traffic across the WAN to a NetWare for SAA gateway. The gateway could then be channel-attached to the host or could link to a 3745 front-end processor (FEP).

The current version of NetWare for SAA includes DSPU support but requires that the connection between the host and the gateway, and between the gateway and the clients be the same, said Michael Ober, product-line manager for the NetWare Systems Group. That is inconvenient for users that may have token-ring links in the LAN but use a leased line to connect to the host. NetWare for SAA 2.0 will support a range of connections to the LAN and to the host.

PROTOCOL INTEGRATION

The DSPU support would let users pipe their SNA, IPX and TCP/IP traffic across the WAN, rather than maintain dedicated channels for 3270 traffic from the 3174s, said Cindy Borovick, an analyst at International Data Corp. (IDC) in Framingham, Mass.

It could also save bandwidth by routing 3270 traffic via NetWare Link State Protocol (NLSP) from a local NetWare for SAA gateway to a channel-attached gateway, said Mike Rothman, an analyst at META Group, Inc. in Herndon, Va.

NLSP, which is replacing the Service Advertising Protocol and Routing Information Protocol across the WAN, slashes bandwidth utilization by drastically reducing the number of messages broadcast across the WAN.

Using NetWare for SAA as a DSPU could also let users eliminate low-end 3745 FEPs by channel connecting the gateways directly to hosts and letting 3174 cluster controllers route through the gateway.

Other vendors, including Memorex-Telex Corp., which bundles NetWare for SAA with its gateway, already offer DSPU and tn3270 support as add-ons.

"The market for 3174s is definitely declining, and SNA gateways will take up a lot of the slack," said Elizabeth Range, an analyst at IDC.

NetWare for SAA 2.0 will include the ability to automatically shunt sessions from one gateway to another to balance the processing load, Ober said.

It also will include a NetWare 4.1 run-time version, which will let independent software vendors and systems vendors develop products for NetWare for SAA on NetWare 4.1, as well as give them access to NDS, NWAdmin and other 4.1 features.

"Where'd My Data Go?" You Wondered.

For as long as organizations have been trying to integrate older networking protocols with today's LAN data in the same internetworks, users have been losing data. Parts of files, gone! Entire files, vanished!

Frustrating, at the very least. Definitely unacceptable in business-critical applications. And add to that the delays that were also involved. And the variations in delay. And the inconsistent network availability...

Ascom Timeplex has developed an internetworking architecture that lets you integrate SNA and LAN data into a single network with absolutely no compromise in quality and service.

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Whitetree ATM wares take root

BY PEGGY WATT

Palo Alto, Calif.

Start-up Whitetree Network Technologies, Inc. this week will unveil one of the first ATM-to-the-desktop products, a 12-port switch supporting any mix of 25.6M bit/sec Asynchronous Transfer Mode and switched Ethernet connections.

The WS3000 Workgroup Switch will let users ease into switching, providing desktop connectivity via ATM cards developed by Whitetree investor Madge Networks, Inc., third-party Ethernet adapters and Category 3 wiring common in workgroups.


BAUER

"It's meant for a transition or a coexistence," said Kurt Bauer, Whitetree's vice president of marketing and business development. "It doesn't make sense to bet against Ethernet."

The unit also has two Network Option slots, which will let users stack up to 12 switches for a total of 144 ports. The slots also can provide connectivity to other net devices, such as routers, servers and PCs, or support a high-speed uplink to a backbone network via 155M bit/sec ATM. The switch, which will begin shipping in March, can be managed via any Simple Network Management Protocol console.

Whitetree's implementation lowers risk and lets users implement ATM selectively, said Thomas Nolle, president of CIMI Corp., a consultancy located in Voorhees, N.J.

"Most desktops will not be empowered with ATM, so it's crucial that [companies can try out ATM] without changing hubs," he said.

To ensure that users' existing shared-media LAN applications can run unmodified over ATM, Whitetree will offer LAN Emulation Services and LAN Emulation Clients software.

COMPETING SPECS

Whitetree last fall helped organize the ATM25 Alliance, which persuaded the ATM Forum to reconsider a 25M bit/sec standard and look at a 51M bit/sec spec. Subsequent competition arose between 25.6M and 25.9M bit/sec specs, but the 25.6M bit/sec vendors — including IBM — have been first to introduce products. Analysts said customers will implement one of the 25M bit/sec ATM varieties on LANs and leapfrog to 155M bit/sec for backbone installations.

"I sense the tide has turned in favor of ATM 25.6," which is faster than Ethernet and less expensive than high-speed ATM, said Ron Jeffries, principal at Jeffries Research in Santa Maria, Calif. "Low-speed ATM won't rule the world, but it's going to have a nice niche for a long time."

The WS3000 Workgroup Switch starts at $650 per port and costs $7,795 for 12 ports of switched Ethernet or 25.6M bit/sec ATM. Modules start at $995; a fiber version of the Network Option module costs $1,395, and a 25.6M bit/sec Peripheral Connect Interface bus adapter costs $395.

Whitetree's pricing should prove attractive, according to Nolle, whose research shows the ATM breakthrough price is about $1,200 per desktop.

✆Whitetree: (415) 855-0855.

Firms cut ATM switches down to size

BY MICHAEL CSENGER

Washington, D.C.

Cascade Communications Corp. and General DataComm, Inc. (GDC) last week unveiled minified versions of their wide-area ATM switches, continuing a market trend toward scaled-down price and size.

For about the same price as most Asynchronous Transfer Mode access multiplexers, the new switches share all the functionality of their big brothers, with a unified management system, as well. They can be used as full-function concentrators or as WAN nodes in a small private network. Access multiplexers serve a lesser role, simply mixing different traffic types and feeding it onto an ATM link.

Other vendors' mini WAN switch offerings include the Northern Telecom, Inc. Passport Model 50 and the Newbridge Networks, Inc. four- and six-port 36150 MainStreet versions.

"We wanted full-featured ATM switches, not just simple feeders," said Larry Keller, program manager

See **ATM switch**, *page 57*

THE BATTLE CONTINUES

Sprint looks ahead

PCS AUCTION update

WirelessCo, the Sprint-cable TV venture, announced alliances with two companies bound to be players in an auction scheduled for later this year in which businesses owned by minorities and women will receive credits. The alliances are with National Telecom, Inc., a minority-owned firm in New York, and New Communications Services, Inc., a woman-owned firm in Los Angeles.

Shown are the high bidders for each of the two available 30-MHz blocks in each of the 10 largest markets offered by the FCC. Three markets - New York, Southern California and Washington, D.C.-Baltimore - have only one block available due to an earlier award.

Round 51, Thursday, Jan. 26

Region	Bidder	Bid (in millions)
New York	Craig McCaw	$330.4
Southern California	Pacific Telesis	$330.0
Chicago	WirelessCo	$269.5
	GTE	$269.5
San Francisco Bay Area	WirelessCo	$123.4
	Pacific Telesis	$132.0
Detroit	AT&T	$81.2
	WirelessCo	$78.1
North Carolina	AT&T	$66.6
	BellSouth	$70.9
Dallas-Fort Worth	WirelessCo	$62.1
	PCS Primeco	$62.2
Boston-Providence	AT&T	$121.7
	WirelessCo	$105.0
Philadelphia	AT&T	$81.0
	PhillieCo, L.P.	$85.0
Washington-Baltimore	GTE	$121.3

PCS Primeco = NYNEX, Bell Atlantic, US WEST and AirTouch Communications

To the victors go the spoils

10th USER EXCELLENCE AWARDS

The winners of *NW*'s Tenth Annual User Excellence Awards took to the stage during a special ceremony at last week's ComNet '95 conference. Phil Smith accepted the accolades for the state of Iowa and the Iowa Communications Network, while John Biggs did the honors for Hyatt Hotels' Regency Systems Solutions, the information systems unit that, among other things, runs Hyatt's reservations network.


Phil Smith


John Biggs

PHOTOS BY WALTER P. CALAHAN

IBM lays out ATM and LAN switching road map

BY MICHAEL COONEY

Washington, D.C.

IBM last week released further details on its proposed rollout of Asynchronous Transfer Mode campus network products and outlined its plans to help users migrate to fully switched enterprise networks.

At a briefing here, company executives said IBM by year-end will add 155M bit/sec interfaces to its hubs, switches and personal computer adapters, giving users the underpinnings to eventually link to high-speed ATM backbones.

In addition, IBM said it will roll out a small ATM-based Workgroup Switch that will act as a feeder node to IBM's 8260 ATM hub and said its first Token-Ring switch will be available by midyear. IBM also said it expects its controversial 25M bit/sec desktop ATM technology to be finally accepted as a standard this year.

ComNet

"Our strategy is to provide the tools, products and services for users to build a completely switch-centric network by the end of the year," said Antoine Granatino, director of IBM's campus ATM products. "We will also continue to provide the tools necessary for users to migrate their existing equipment to this new environment."

Analysts said IBM is banking on its ATM and LAN switching products to help it regain control of the enterprise net infrastructure it lost by not having successful internetworking products.

"Our message is that if users haven't invested in large backbone routers, they probably should not now," said Rick McGee, IBM's director for networking controllers. "They should be looking to deploy [backbone] switches, such as the Nways 2220, and begin to build a switched infrastructure — with smaller routers and hubs feeding into it."

DOWN AT THE DESKTOP

Opening up as much of the desktop market to ATM as possible, IBM will begin offering a 155M bit/sec Peripheral Component Interconnect (PCI) board by year-end, Granatino said. The new board will come in client and server versions.

IBM will also begin offering a 25M bit/sec ATM adapter card for Micro Channel Architecture- and PCI-based workstations. Today, 25M bit/sec is offered only on Industry Standard Architecture buses. The new boards will be priced the same as the existing ISA boards — $395 for groups of five.

To connect those 25M bit/sec users to the ATM backbone, IBM soon will offer a 25M bit/sec Workgroup Switch. The device will support 12 users and cost about $4,800. It will have a 155M bit/sec interface to an upstream 8260 ATM hub, Granatino said. The switch will augment the current 8282 ATM concentrator, which is being incorporated into the 8260 hub.


McGEE

The 8260 hub itself will gain a 155M bit/sec interface to IBM's Nways ATM switches by year-end.

"IBM is still being aggressive on its ATM rollout, but with all of the turmoil within Networking Systems, it is unclear at this point whether they can deliver this stuff," said Thomas Nolle, president of the CIMI Corp. consultancy in Voorhees, N.J.

Networking Systems saw 10% of its workforce cut last year, and on Feb. 1, Ellen Hancock, group executive and senior vice president, will retire (*NW*, Jan. 16, page 4). She is credited with jump-starting IBM's ATM effort.

Finally, IBM said its long-awaited 8272 Token-Ring switch would be available in June for about $500 to $600 per port. The eight-port box, jointly developed with Kalpana, Inc., will support 4M and 16M bit/sec full-duplex Token-Ring connections to LAN segments, individual users or servers.

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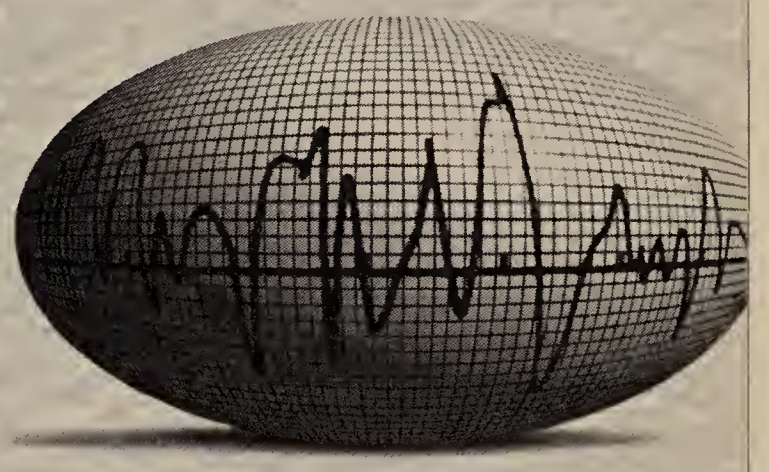

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Database vendors shoot for bulletproof security features

BY BARB COLE

Menlo Park, Calif.

Spurred by customers looking to explore Internet-based commerce, several database providers are ramping up the security features of their core database and connectivity products.

Sybase, Inc. and Informix Software, Inc. both plan to boost the security features of their database products by year-end, sources at the companies said.

Both firms currently offer government customers special versions of their databases with several levels of password security and data encryption. But these "secure" databases typically require a special version of Unix on every desktop and do not support Microsoft Corp. Windows clients.

Traditional databases, on the other hand, usually limit security to verifying user logons and maintaining an audit trail of transactions.

By the end of the year, Informix will essentially meld the secure version of the firm's database into its mainstream Informix On-Line Dynamic Server.

"The advanced security features will come with every database, and users will be able to click on a series of check boxes and pick which features they wish to exploit," said Bob Hedges, manager of secure market development at Informix.

In addition, Informix will improve the database's ability to verify users, he added.

"We're going beyond user ID," Hedges said. "We're looking at identifying users based on the application they're using and what I/O port they're on." For sessions involving sensitive data, Hedges said the company is also adding mechanisms that esentially turn a personal computer into a dumb terminal to prevent tampering.

Rival Sybase is developing an application program interface (API) that will let administrators snap in additional third-party security products to work with Sybase databases, according to Don Brinkley, product manager for security at the firm.

He said the API, expected by the end of the year, will let administrators exploit directory services such as those provided by Novell, Inc. and Banyan Systems, Inc., and specifically Microsoft's Windows NT and the Open Software Foundation, Inc.'s Distributed Computing Environment. In addition, the API will provide links between third-party security products as well as Sybase databases and connectivity tools, Brinkley said.

Several banking customers of Sybase and Informix were enthusiastic about the move to improve security.

"We're not doing much in the way of Internet-based banking yet, but for us even to consider it, we need more security in our database," said an information technology specialist at a large New York-based bank who requested anonymity.

Computer Associates International, Inc. (CA) plans to tightly integrate its CA-OpenIngres database with its Unicenter management offering to improve security, according to Allan Paller, director of open systems at CA. He said this will give administrators the ability to limit user access to data depending on the time of day that they log on. Additionally, it provides a single point of security management, so database security is taken out of the hands of the database administrator.

Oracle is shipping Secure Network Ser-

See **Security**, *page 55*

Keeping a lock on data

Company	Security plans
CA	Will integrate its CA-OpenIngres database with its Unicenter management system by the second quarter to allow for a central point of security control.
Informix	Will meld secure version of its database with its regular version by year-end; will result in additional password security and encryption being included at no charge.
Oracle	Offers Secure Network Services add-on to its SQLNet middleware that adds encryption and integrity checking to any Oracle-supplied, custom-written or third-party application that works with Oracle7.
Sybase	Will roll out an API by year-end that lets administrators use third-party security products with Sybase databases and gateways.

Internet

Continued from page 1

(see graphic). While difficult, this is not unfeasible because most TCP/IP software uses a predictable sequence number rather than a random one, said Steve Bellovin, a researcher in network security at AT&T Bell Laboratories.

IP spoofing attacks are almost impossible to detect, although the most recent victim, researcher Tsutomu Shimomura, said he was able to document it because of the extensive packet audit log he maintains.

Few software programmers have the knowledge to carry out an IP spoofing attack, but they apparently are sharing that knowledge, Geer said.

"There's a program, called Crack, for mechanically breaking passwords, and now IP spoofer programs are becoming generally available on the Internet, too," he said.

SCALING THE WALL

A router firewall to the Internet is not enough to guard against IP spoofing. "Internal attacks, including those from disgruntled employees, have to be figured in, too," he said.

Added Bellovin, "Don't rely on address-based authentication in your network. You need cryptographic authentication, such as Kerberos, and a onetime password system."

Kerberos is a client/server authentication system developed by Massachusetts Institute of Technology researchers and implemented by vendors such as Redmond, Wash.-based CyberSafe Corp. It relies on encrypted passwords, not IP addresses, to let one computer talk to another.

To deter IP spoofing attacks from the outside Internet, a firewall — either a router or a computer-based gateway — must be equipped to determine the physical line from which the incoming packet originated.

The CERT advisory on IP spoofing recommended that managers install a router with a filter that does not allow packets to enter from the Internet if they have a source IP address that matches an internal network address. CERT also recommended filtering outgoing packets that have a source address different from the organization's internal address.

CERT noted that Bay Networks, Inc.'s router software Versions 5.0 and higher support this filtering feature, as does Cisco Systems, Inc.'s software Versions 9.21 and higher. All Livingston, Inc. routers as well as Cabletron Systems, Inc.'s LAN Secure product also support this filtering.

And Harris Computer Systems Corp. said its CyberGuard FireWall product can search for discrepancies between IP addresses and the network from which the message originated.

FEAR IN CYBERSPACE

The specter of IP spoofing has raised alarm at many companies.

"The headlines generated a lot of concern, and I had to calm fears," said Dave Norton, systems strategist at Trane Co., which uses an encrypted private IP backbone provided by Advanced Network & Services, Inc. to link several corporate sites.

Norton's company built its own firewall gateway — what it calls the LAN-based Demilitarized Zone — that scans every packet going in and out of the corporate network and prevents unauthorized entry.

IP spoofing is a worrisome issue but not enough to scare the company off the Internet, Norton said.

Others, however, are spooked.

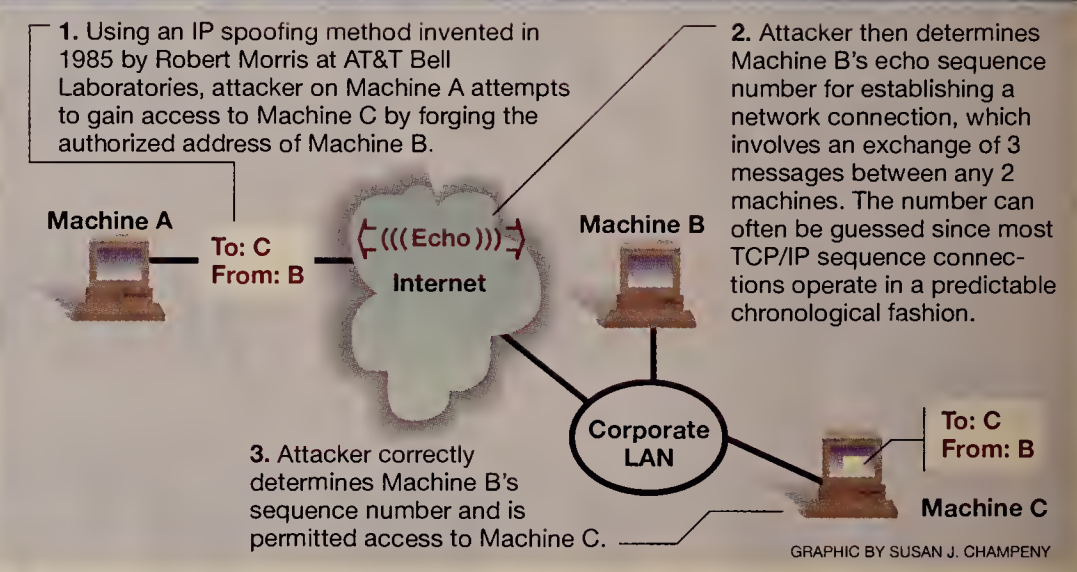
"We would like to jump into the Internet more for business reasons, but because of the lack of definitive security, we haven't," said David Hibsham, network manager at farm equipment manufacturer New Holland North America, Inc.

IP spoofing is not the only drawback to Internet use. At AlliedSignal Automotive, a supplier of car parts and systems, lawyers a month ago told employees to stop sending computer-aided design files and other proprietary information over the Internet, said John Crary, vice president of IS and service for the firm.

"Our legal people said that because the Internet is public domain, anything transmitted over it cannot be protected," he said.

Network World staff contributed to this story.

The Sequence Number Guessing Attack



GRAPHIC BY SUSAN J. CHAMPENY

INTERNET tip

BY ELLEN MESSMER

IP spoofing

The papers "Security Problems in the TCP/IP Protocol Suite" by Steve Bellovin and "A Weakness in the 4.2BSD Unix TCP/IP Software" by Robert Morris can be obtained via the Internet:

To access: Via anonymous FTP, connect to **ftp.research.att.com** and then switch to the **/dist/internet-security** directory. For Bellovin's paper, get **ipext.ps.Z** or get **117.ps.Z** for Morris' paper. Use anonymous FTP to connect to info.cert.org for CERT advisories and information related to computer security. To call the CERT Hotline to report intrusions, dial (412) 268-7090.

Security speak-out

"The lack of security scares the hell out of me. But it's not driving us away. Our vision is to open [our business up to the Internet]."

Timothy Kuhfuss, manager of high-performance networks, Argonne National Laboratory

"There is a dark side, an evil empire that would like to see anarchy rule. But vendors must work to create firewalls that will make global networking secure."

Ellen Hancock, IBM senior vice president and group executive

"Somebody's going to have to devise a method of detecting these [hackers] before we use the Internet freely for financial transactions."

Bill Dean, president of Master Communications Group, a video production house

BW-Connect NFS Extends Integration Possibilities for Windows NT 3.5

RALEIGH, N.C. — Beame & Whiteside Software is now offering BW-Connect NFS for Windows NT, as its Network File System (NFS) solution that is fully compatible with both workstation and server versions of Windows NT 3.5 and 3.1.

Early adopters of Windows NT v3.5 are already discovering the benefits of adding NFS support. Scott Hays, System Administrator for Carroll, Burdick & McDonough, has found BW-Connect NFS for Windows NT to be an ideal integration solution for the San Francisco-based law firm. Carroll, Burdick & McDonough maintains an Artificial Intelligence database on a Sun UNIX server with more than 50 PCs. Using NFS as the connectivity protocol and a Windows-based search client, the PC workstations can access Sun-stored data in just a few seconds. And Hays is using BW-Connect NFS for Windows NT to help consolidate the law firm's database, system backup, and print services.

"We are essentially using NT's file capabilities to set up a gateway between Windows for Workgroups and the Sun Server with the help of Beame & Whiteside's BW-Connect NFS for Windows NT," Hays explains. "By cross-mounting drives from Sun NFS and making them available on Windows NT, Windows for Workgroups systems can access files directly from the NT server without having to use additional NFS software."

Hays is using NFS to consolidate system backup using the 10-tape stacker already installed at the Sun server. He is also using the print redirector in BW-Connect for Windows NT to give users better control of centralized print services; a particular challenge since his users have been used to having access to dedicated laser printers.

"Support for NFS is really opening some major doors for us in implementing Windows NT," Hays adds.

BW-Connect NFS for Windows NT was written as a 32-bit, kernel-mode application to take advantage of the multithreaded architecture of Windows NT. BW-Connect NFS for Windows NT can maintain up to eight simultaneous threads to handle independent data transfers. The software has also been tested to be very fast, delivering data transfer rates up to 1,000 Kbps (1Mbps). It runs on any computing platform that can support Windows NT, including the Intel 80x86, Pentium, MIPS, Alpha AXP, and PowerPC platforms.

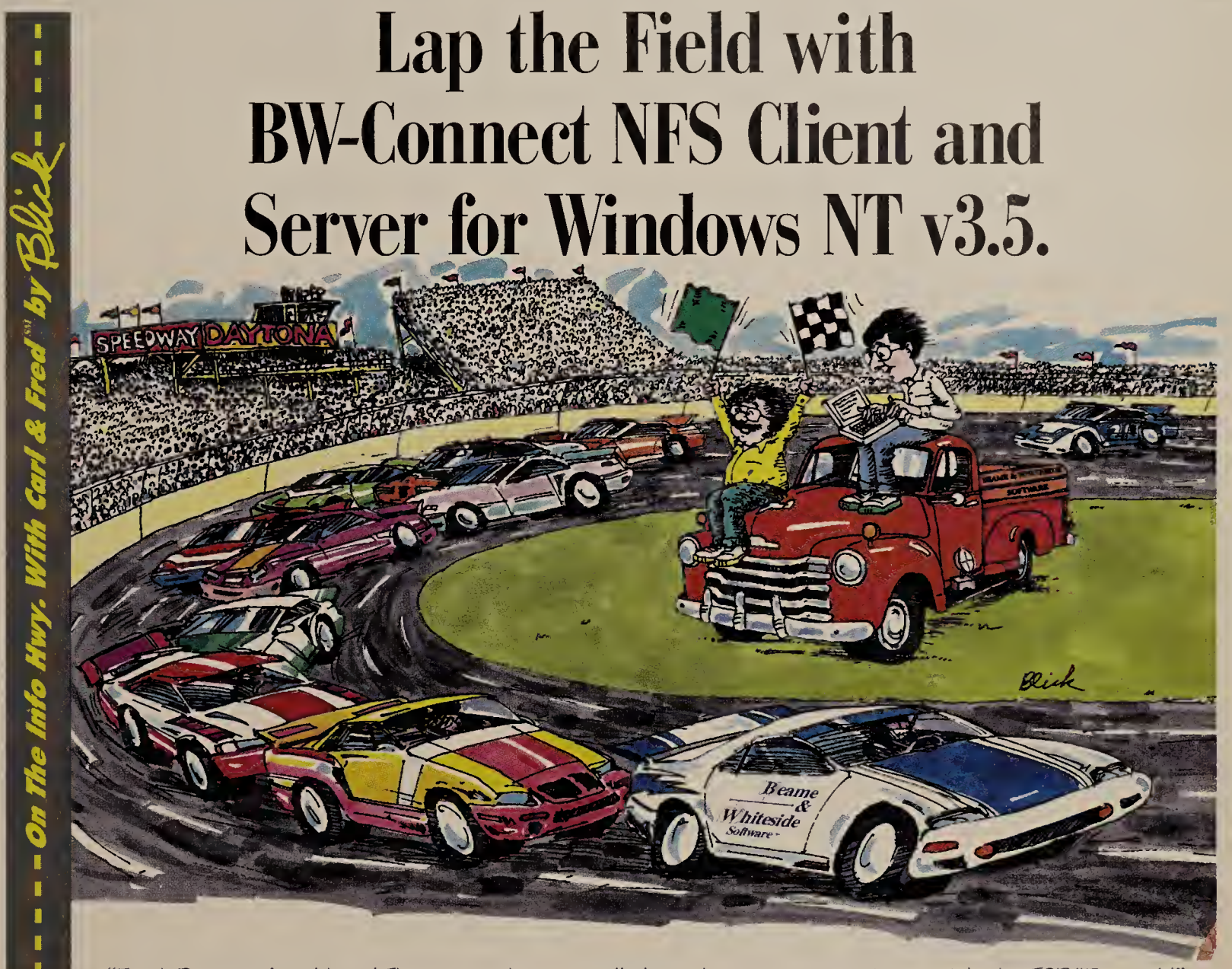
BW-Connect NFS also offers a full suite of TCP/IP client/server applications, including an electronic mail handler for SMTP (Simple Mail Transfer Protocol) and POP2/3 protocols. Other modules include drag-and-drop FTP (File Transfer Protocol), TFTP (Trivial File Transfer Protocol), FINGER (network user information), TALK (a chat function), and PING (for network testing).

Beame & Whiteside's terminal emulation software, BW220, is also included to provide support for VT200, VT100, VT52, and TN3270 terminal emulation, and can support up to 64 different TELNET sessions.

BW-Connect NFS for Windows NT also includes INET and TELNET daemons (INETD and TELNETD. Patterned after the UNIX INETD, Beame & Whiteside's INETD provides peer-to-peer functions among connected machines (LAN or WAN) by implementing server functions for TCP/IP-based applications. INETD is installed as a Windows NT service and remains active in the background, waiting for connection requests.

For more information about BW-Connect NFS for Windows NT, contact Beame & Whiteside Software at (800) INFO-NFS.

Lap the Field with BW-Connect NFS Client and Server for Windows NT v3.5.



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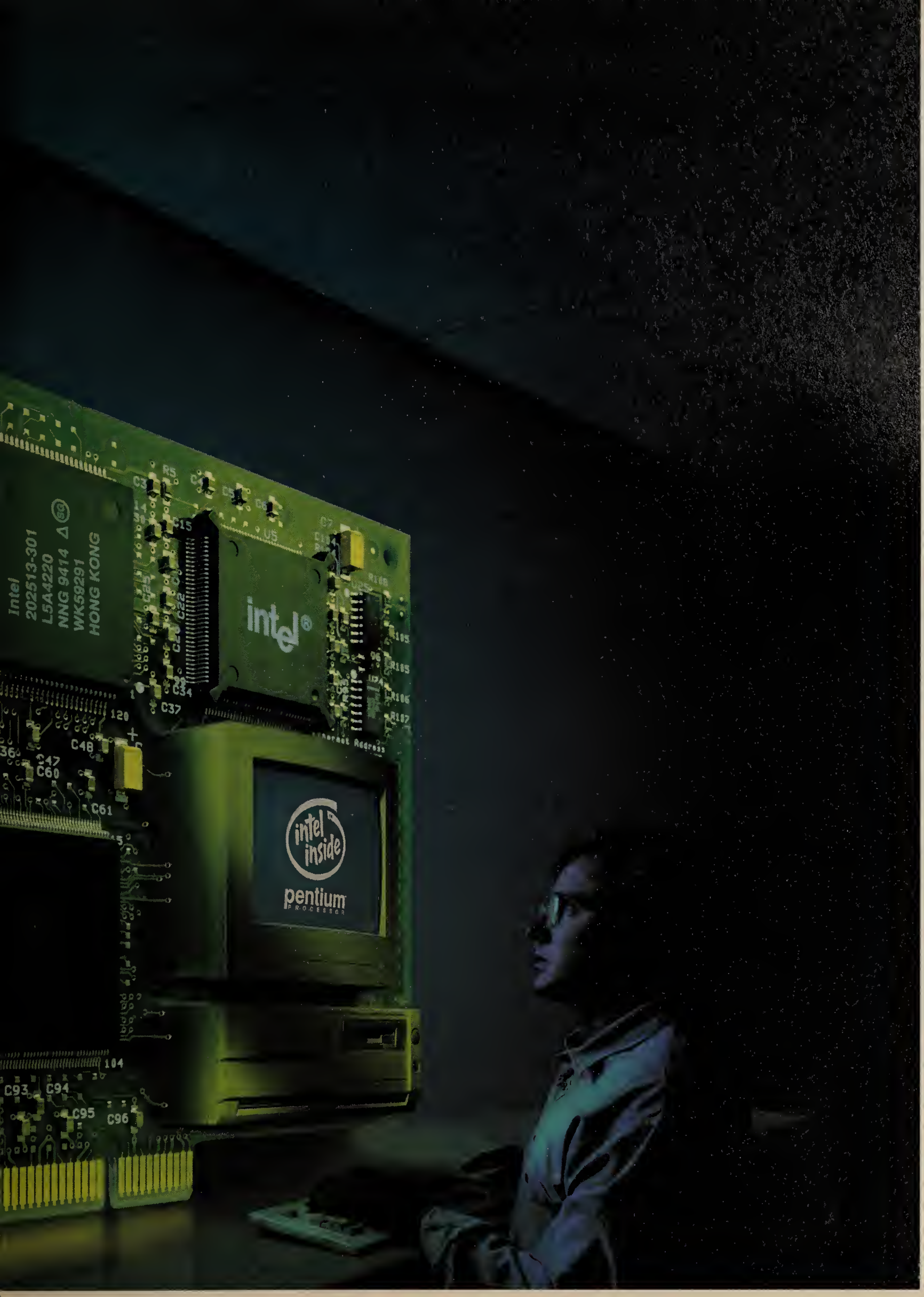

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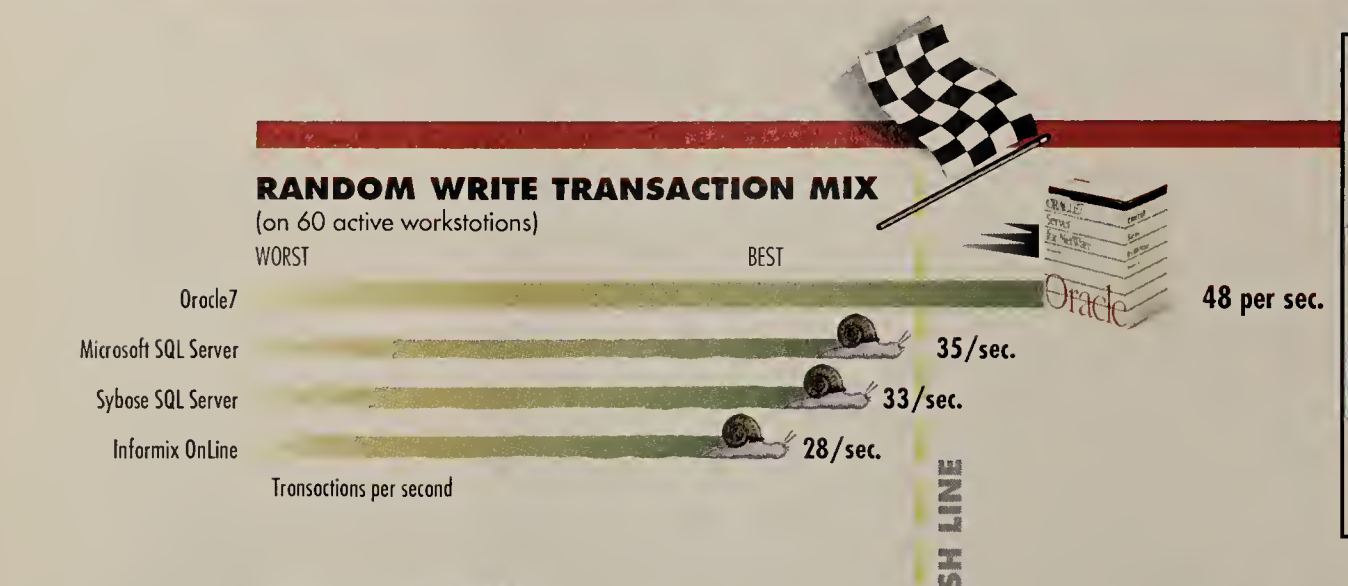

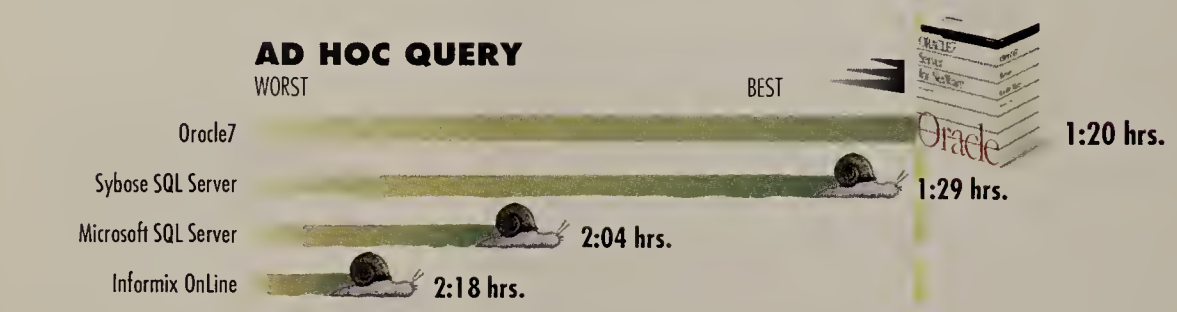

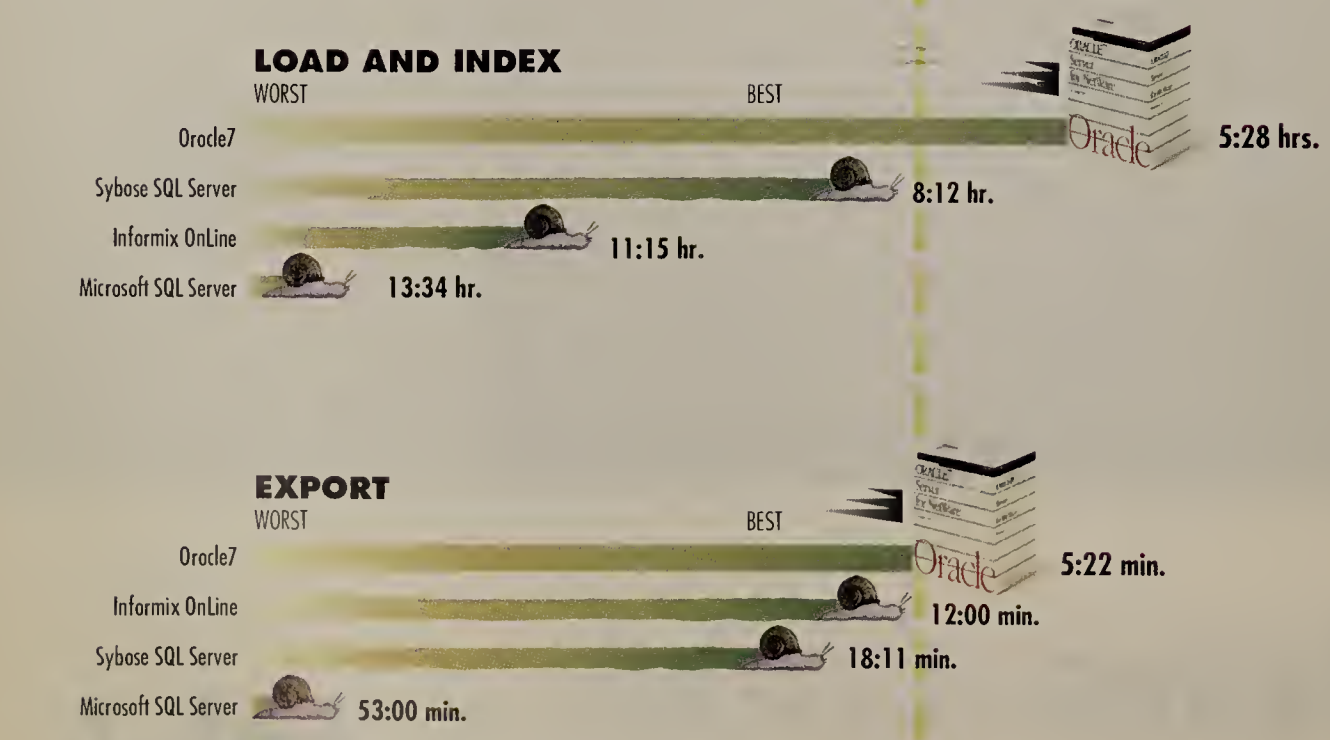

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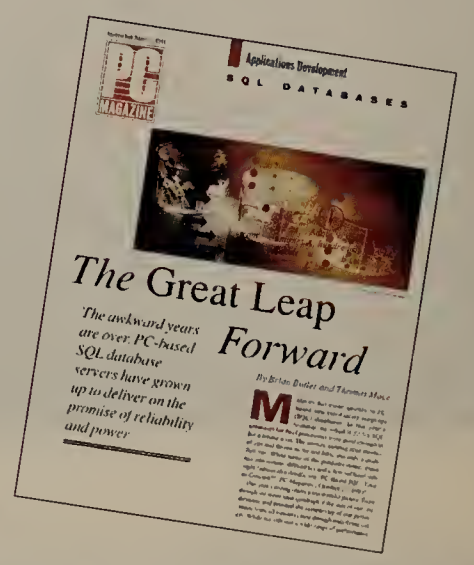

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ORACLE

Start-up fields time-stamp system

Company unveils first electronic file validation software.

BY ELLEN MESSMER

Chatham, N.J.

Start-up Surety Technologies, Inc. this month began shipping desktop computer software that gives corporations a way to electronically notarize and time-stamp important documents.

Companies commonly have paper documents certified by notaries in order to prove the document's authenticity. The Surety Technologies software, used in conjunction with its Internet-based archive service, for the first time gives companies a way to notarize documents electronically over a network through the Digital Notary System.

With the Digital Notary client software for Windows or Unix running on their desktop computers, users can compress and time-stamp a file employing a mathematical algorithm, called a "hash."

Each time-stamped document's hash is as unique as a fingerprint, so only the identical document would produce the same fingerprint in the future.

The Digital Notary client software stores this fingerprint — actually a string of digits — and simultaneously transmits it over the Internet to Surety Technologies' Coordinating Server.

At the server, incoming file fingerprints are certified with another hash timestamp and then stored in the firm's Universal Validation Record database. The contents of the database are published once a week in *The New York Times*, establishing a public record of the electronic files. The database summary also will soon be published on the Internet.

"The system is technically excellent," said Bruce Schneier, president of consultancy Counterpane Systems in Oak Park, Ill. "But the real question is, will it be accepted and used?"

Pharmaceutical giant American Cyanamid Corp. has been beta-testing the Digital Notary System and is eager to implement it.

"The Surety software for Windows works well as a single workstation implementation, but we want to make it server-based within the corporation so we can validate documents by integrating the Digital Notary System into Lotus Notes," said Gary Kuehlanz, manager of advanced technology at American Cyanamid.

The firm has an array of research data that must be notarized to substantiate patent claims, he said.

"Our scientists have to manually submit the test scripts and other documents to be witnessed by another individual under the federal rules of evidence," he noted. "The paper is getting out of hand, and we'd like to use the computer as the witness instead."

Surety Technologies cofounder Stuart Haber says to look for a LAN-based version of the software and tool kit in March.

Stuart Haber, chief scientist and cofounder of Surety Technologies, said a LAN-based version of the software and an application program interface tool kit will be ready by March.

The Windows and Unix-based versions of the Digital Notary System, which cost $49 each and include 50 time-stamped certificates, shipped this month.

Palo Alto, Calif.-based consultancy Anagram Laboratories beta-tested the Surety Technologies software for three months. In the case of a dispute, it is uncertain whether a court would accept the evidence offered under the Digital Notary System, said Thomas Berson, principal at Anagram.

Yet a leading authority on electronic commerce law, attorney Michael Baum of Cambridge, Mass.-based Independent Monitoring, offered an optimistic legal assessment.

"I don't see any obvious legal disabilities in this technology, to the extent that it's designed and implemented with accepted quality in the service and the hash algorithms," Baum said. "You may need to know the time at which a document was created, and this provides yet another level of proof and an indicator of a transaction."

Presticom adds TCP/IP to branch office router

BY MICHAEL COONEY

Saint-Hubert, Quebec

Presticom, Inc. this week will add TCP/IP routing and Data Link Switching (DLSw) options to its menu of branch office connectivity offerings.

The options, to be added to the NetPerformer BCX-6000 multiprotocol bridge/router family, give users new ways to route multiprotocol traffic over TCP/IP backbones. Besides DLSw, they include support for the TCP/IP Routing Information Protocol (RIP).

Until now, BCX-6000 only supported a proprietary multiprotocol routing scheme or Point-to-Point Protocol connections over a frame relay net.

DLSw is a method of sending Systems Network Architecture and NETBIOS traffic over TCP/IP-based internets. RIP is a distance-vector routing protocol that picks the shortest path through a network based on the number of hops.

The BCX-6000 uses cell-based technology and data compression techniques to prioritize traffic and ensure the delivery of SNA and LAN data in enterprise nets.

The BCX-6000 is different from branch office competitors, such as Hypercom, Inc., Eicon Technology Corp. and Cisco Systems, Inc., in its cell-based switching architecture. It begins with the BCX-6000's Protocol Sorter, which looks at incoming datastreams from local LAN and serial ports, and identifies each protocol in use. The sorter then assigns a "weight" to each protocol, based on user-defined criteria, with higher weight protocols moved to the front of the queue.

This ensures that high-priority traffic, such as SNA, reaches its destination quickly, but also makes certain that lower priority traffic is not choked off, said Gaston Poire, executive vice president of Presticom.

The fragmentation and data compression feature then takes over, breaking the data frames coming in from the Protocol Sorter into 48-byte cells. These small cells are more easily and efficiently handled by the BCX-6000 and improve throughput of the box by 30% as compared with regular frame passing methods, Poire said.

Under heavy traffic loads, the BCX-6000 uses a data compression algorithm that can shrink data by as much as one-third for even faster throughput.

Finally, the Programmable Variable Cell Relay feature lets users set the ratio of routed high- and low-priority data. The BCX-6000 also recognizes SNA's priority and class-of-service schemes.

"The cell-based technology Presticom uses is a more efficient way of transporting data than [via] packets or frames," said Lynn Nye, president of the NetResults consultancy in Portland, Ore. "Because the cells are smaller and don't have to be filled before they can be moved along, the BCX-6000 can pass data quickly."

On the negative side for SNA users, the NetPerformer does not support a host NetView connection. But it contains a Simple Network Management Protocol agent so it can be managed by any SNMP-based platform.

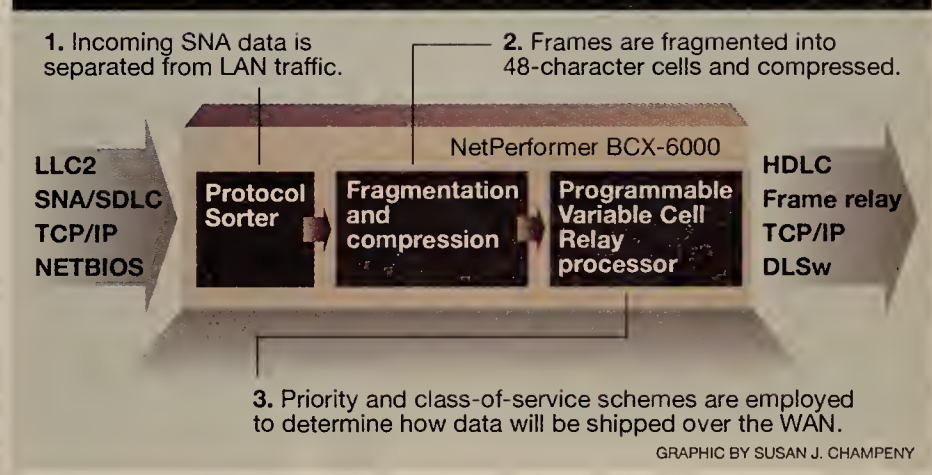
NetPerformer BCX-6000 supports one token-ring or Ethernet LAN interface and as many as seven local serial ports for Synchronous Data Link Control, Binary Synchronous Communications, X.25 and other synchronous traffic. The box also supports SDLC-to-Logical Link Control 2 translation.

For wide-area connectivity, the BCX-6000 supports two to eight ports for leased or switched circuits operating at speeds from 1,200 bit/sec to T-1.

Pricing for the NetPerformer BCX-6000 starts at $6,000. The new TCP/IP RIP and DLSw support will be built into new machines. Existing users can add the new features for free.

Presticom: (514) 443-2909.

Presticom's NetPerformer sorts it all out



GRAPHIC BY SUSAN J. CHAMPENY

BRIEFS

LEGENT Corp. and **Software AG** last week announced that Software AG will use LEGENT's AgentWorks Agent Factory tool kit to develop management software for its database and application development middleware.

Software AG will develop **Simple Network Management Protocol intelligent agent software** for its relational database server, remote procedure call and messaging middleware. The agents, which will be interoperable, will let users manage Software AG products from OpenView, SunNet Manager and NetView for AIX, as well as from LEGENT's AgentWorks Enterprise View platform.

The two companies also will work together to help companies select and build SNMP management infrastructures, and provide SNMP-based management across heterogeneous operating system platforms and protocols.

LEGENT: (800) 676-5468; Software AG: (703) 860-5050.

Bay Networks, Inc. last week demonstrated standards-based Asynchronous Transfer Mode signaling and LAN emulation at the ComNet '95 show in Washington, D.C. **LAN emulation,** which uses switched virtual circuits established via signaling, lets existing LAN applications operate in an ATM environment. Bay's demonstration featured its SynOptics LattisCell and EtherCell switches, as well as network interface cards from Interphase Corp. and Efficient Networks.

COMNET

The demo showed Ethernet LAN access to ATM-based servers and Ethernet-to-Ethernet connections through an ATM trunk. The capabilities on display conformed to ATM Forum specs for LAN emulation and signaling. All of the products are shipping.

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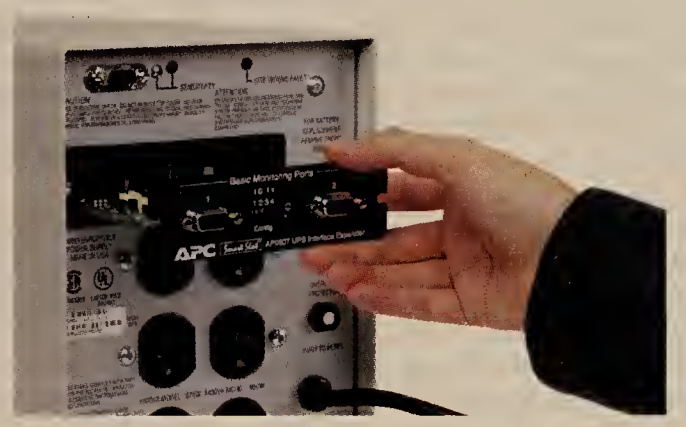
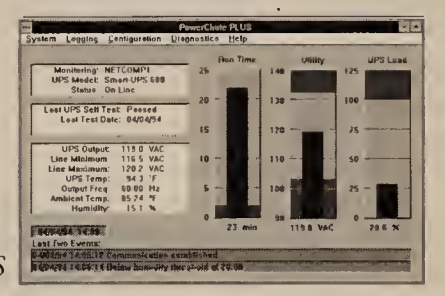
1 Want SNMP management, control via modem, or multi-OS support? New SmartSlot™ built-in accessory slot lets you customize the unit to suit your changing needs.



Ever want a new feature the unit you just bought doesn't have? APC's new Smart-UPS are equipped with an internal accessory slot which allows you to install an optional SmartSlot Accessory board. You can add capabilities as your network grows. SmartSlot accessories plug directly into your Smart-UPS. Currently you can choose from a Remote UPS management Device (for management via modem), UPS Interface Expander (to communicate with multiple servers from one UPS) and PowerNet SNMP Adapter (for wide-area management).

2 Paging or E-Mail on power failure? FlexEvents™ delivers custom notifications.

With optional PowerChute™ *plus* software you can configure the UPS' reaction to power problems, allowing you to plan for and control crisis situations before they impact uptime or threaten your data. For each possible power event users can choose one or more of the following UPS actions: Log Event, Notify Administrator, Notify Users, Shutdown Server, Run Command File, Page and Send E-Mail.



Optional PowerChute plus UPS management and diagnostic software provides unattended system shutdown, UPS testing/status, remote UPS management and environmental power monitoring.

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NWW 1/30/95

Northern, Fore Systems unite to merge their ATM offerings

BY MICHAEL CSENGER

Washington, D.C.

Northern Telecom, Inc. and Fore Systems, Inc. last week announced an alliance that will meld Fore's LAN ATM and Northern's wide-area, carrier ATM offerings into a unified end-to-end feature set.

Fore's ForeThought Asynchronous Transfer Mode software will be added to Northern's Magellan Passport and Concorde ATM switches, and will also support features such as LAN emulation and IP multicasting. The goal is to provide seamless switched virtual circuits across private or public WANs.

ComNet

The companies will also marry their network management software, allowing net managers to administer LAN/WAN networks as one.

A team of about 10 Northern and Fore engineers, managed by Fore, will develop new WAN ATM products, the first of which could be announced late this spring.

"This isn't the Northern your dad knew," said Bill Conner, Northern's vice president of global enterprise solutions. "This is a new business model for us. I think you'll see we've done away with the not-invented-here syndrome."

"I think we're going to see initially a stereotypical vendor relationship. But I'd be surprised if we don't see a more formal [equity] position by the end of the year."

Pat Springer

Experts hailed the arrangement as a wise move for Fore. While the contract — signed before reporters last week at a ComNet '95 press conference here — included no equity interests, analysts expect this is just the first step toward a more formal relation.

If the companies decide they get along, Northern will likely take a 10% to 15% equity stake in Fore, perhaps by year's end, said Pat Springer, a senior consultant with CTG, Inc. in Waltham, Mass.

Conner would not prophesy Northern's plans but agreed that the companies are now 'engaged,' with more intimate intentions in mind.

The move could be Fore's saving grace. "There's no way they could survive without this," said Ron Jeffries, president of Jeffries Research, a consultancy based in Menlo Park, Calif. "This market is going to be brutal," he said.

Fore will face a much more competitive market this year and, despite its early lead with about a 60% market share, will have a hard time continuing its growth without a cash infusion and a partner in the wide area.

Springer noted that Fore's stock valuation of over $800 million does nothing to help the company pay for expanded sales and support. Selling stock to raise cash, or issuing more stock, would simply dilute its value on Wall Street, and the company lacks enough assets to ensure large bank loans.

David Nelsen, Fore's director of marketing for vertical and carrier markets, said the two companies have been working on their first joint development since August of last year.

The companies are working on carrier-based products and will roll out their first offering within six months, according to Nelsen.

Sources said the companies will introduce an ATM service multiplexer in March. Such devices let customers mix several traffic types over a single ATM access link.

The Fore-Northern version will likely be the first to support switched virtual circuits, according to sources.

HELP DESK APPLICATIONS

Remedy unwraps upgrade to its trouble-ticket system

BY JIM DUFFY

Mountain View, Calif.

Remedy Corp. has unveiled a new release of its trouble-ticketing software that features a number of enhancements for help desk applications.

Version 2.0 of Remedy's Action Request System (ARS) offers more efficient retrieval of information, increased performance for enterprisewide operation, streamlined workflow processes and the ability to set up distributed domains.

ARS runs on Sun Microsystems, Inc., IBM, Hewlett-Packard Co., Silicon Graphics, Inc., AT&T Global Information Solutions and Motorola, Inc. servers, as well as Windows, Macintosh, Motif and ASCII terminal clients.

ARS 2.0 features

Full-text search — Performs fast searches for information in SQL databases.

Multiserver option — Automatically distributes and balances workload across multiple ARS servers.

Time-based automation — Escalates problems and initiates processes based on specific time intervals.

Administrative domains — Enables establishment of management domains at workgroup or departmental levels.

For more efficient retrieval of management information, ARS 2.0 includes a full-text search engine. This offers users the ability to perform fast searches in SQL databases for one or several keywords used in ARS text fields, with search results ranked by relevance.

For improved enterprise performance, ARS 2.0 now offers an option that automatically distributes and balances server workload across multiple ARS servers. A systems administrator can control the number and type of server processes that are running based on the requirements and help desk workloads of the organization.

The feature hits home with some ARS users.

"The single server concept bogs down at that server" during heavy workloads, said Cliff Titus, a capacity planner for retail giant Wal-Mart Stores, Inc. "I intend, with this multiserver [option], to get [work] in the hands of our project managers."

ARS 2.0 also allows users to set up administrative domains for management at the departmental level. The benefit of this feature, according to Remedy, is that it allows small workgroups or departments to design custom applications for ARS and set up firewalls to prevent unauthorized access by other departments.

Lastly, workflow capabilities have been augmented in ARS 2.0 with the addition of time-based automation. This feature escalates problems and notifies appropriate personnel when a specific period of time has elapsed.

Time-based automation can also initiate report generation, launch processes and run backup programs on a scheduled basis.

Analysts say ARS 2.0 will especially help larger organizations.

"[Remedy has] some nice features for improved performance, such as the ability to handle larger numbers of concurrent users without impacting performance, which is important because [ARS] is being deployed in some very large accounts," said Jill Huntington-Lee, principal analyst at Brandywine Network Associates in Cinnaminson, N.J.

ARS 2.0 costs $6,500 for a server and three fixed licenses. The optional text search engine is $5,000, and the multiserver option is another $3,000. It is available now.

Remedy: (415) 903-5200.

INTERNETWORKING MONITOR

by Dan Minoli

Truth in advertising

I get annoyed when I see ads in the trade press extolling the features of some new product, but get ignored into oblivion when I call the vendor for more information or confirmation. I guess they don't want to have to admit that all they've got is "inkware."

If someone like me gets nowhere, even after leaving a voice mail saying I'm a consultant who may have eight customers for their product or a member of the press who would like to do a story, how far is an average reader or user going to get?

A few examples will illustrate my point. I remember a triumphant full-page ad campaign in the mid 1980s from one of the leading central office switch manufacturers that said ISDN is finally here. There was plenty of marvelous techno-babble along with claims that ISDN was now as easy to get as a pizza, yet it included no phone number, address or fax number to order it.

Just two months ago, I wanted to see if ISDN could be ordered from a certain carrier for one of my clients. I tried to reach the product manager for more than a week and left messages, not wanting to resort to the 800 number that his voice mail message suggested I call. When I didn't hear back, I finally gave in and called anyway. I was asked a few pertinent questions, and the recorded voice promised to fax me availability and tariff information. I'm still waiting.

Then I saw a statement that another long-distance carrier was ordering fiber-optic cable from a manufacturer that claimed its fiber could support transmission at 10G bit/sec.

Since I track the fiber-optic industry, I knew that 2G bit/sec was the typical rate, at least as of about two months ago. I kicked myself, saying, "You can't blink an eye or you're immediately out-of-date."

I called the manufacturer, saying that as systems engineers involved in building high-end ATM and FDDI networks, my company would like to know more about this fiber and that we had some immediate clients for it (which was true).

It's time vendors put an end to inkware so we can all get down to business.

Instead of providing me with more information, the vendor insisted on putting me through a lengthy discussion of my clients' needs. I never got anything out of the conversation.

They said that perhaps this technology was a bit expensive. I said we have high-end clients who are willing to pay.

In the end, the vendor promised me technical material. It's more than two months later. I'm still waiting.

Recently, I saw an article about this wonderful chip for 100VG-AnyLAN. I called the manufacturer, saying that I was doing an article on 100M bit/sec LANs and wanted to discuss their chip in the article. That was more than six weeks ago. I'm still waiting.

Then there's the much-talked-about ATM services. One long-haul carrier claimed to have it available. I called its 800 number for data services.

About seven 800 numbers later, an actual person told me that I would have the tariff over the fax by the end of the day. It's now five weeks later. I'm still waiting.

Oh, and a representative was also going to call me the next day. Ditto.

You can't build networks on empty promises and inflated claims.

Users and others in the industry need information that's accurate and suppliers that can provide it in a timely fashion. It's time vendors put an end to inkware so we can all get down to business.

Minoli is a principal consultant at DVI Communications, a full-service consultancy in data, voice and video based in New York. He can be reached at minoli@pipeline.com. Minoli shares this space with Scott Bradner, whose column will appear next week.

NET INTEROPERABILITY

Vendors will put net technologies to the test at show

BY PEGGY WATT

San Jose, Calif

Microsoft Corp., Novell, Inc. and dozens of competing network product vendors will gather in March for two weeks of interoperability testing at Connectathon '95, to be held at the San Jose Convention Center.

This year, hot areas will include testing of products that implement 100M bit/sec fast Ethernet as well as IPng (also known as Version 6), the next-generation IP, said Armando Stettner, senior technologist with the network products business group of SunSoft, Inc., a subsidiary of Sun Microsystems, Inc.

The two-week event is closed to the public — except for a one-day open house — and is intended only for engineers so they can test unannounced technology under mutual nondisclosure agreements.

Sun is sponsoring the event, but the content is not restricted to Unix environments or Sun equipment.

Connectathon is "an attempt by vendors to deliver the promise of operating system interoperability so customers don't have to do the work," Stettner said.

The show gives developers the opportunity to test a wide variety of equipment combinations and correct any incompatibilities before their release, Stettner said.

All network vendors are invited to participate for a small entry fee, he added.

"Already we have more participants than we have in the past two years," Stettner said.

Besides Microsoft and Novell, confirmed participants include Digital Equipment Corp., IBM, Intel Corp. and The Santa Cruz Operation, Inc.

The event runs March 6-17, with a portion of the last day open to interested network customers, but some of the unannounced wares will be removed for that occasion, Stettner explained.

Further information about Connectathon is available by calling Hayes Event Management at (219) 324-7313 or by sending electronic mail to connect@sun.com.

Banyan gives TCP/IP wares a face-lift

Swaps out FTP Software apps, protocol stack for Ipswitch tools.

BY KEVIN FOGARTY

Westborough, Mass.

Banyan Systems, Inc. last week announced that it will begin offering a new TCP/IP stack and application suite designed to make it easier for the company's customers to run TCP/IP across their VINES and ENS networks.

Banyan next month will release a client-based TCP/IP stack and application suite from Ipswitch, Inc., a Wakefield, Mass., company that replaces FTP Software, Inc. as Banyan's primary TCP/IP partner. Banyan also will launch a set of TCP/IP applications, including electronic mail, from Ipswitch.

The partnership between Banyan and Ipswitch follows the end of an eight-year relationship between Banyan and FTP Software under which FTP Software has supplied TCP/IP stacks and applications for Banyan customers. The firms have parted ways because FTP Software began increasing its focus on selling products directly to users, rather than acting as an OEM, Banyan officials said.

The Banyan Enterprise Client for TCP/IP is a protocol stack for Windows and DOS personal computers that will let users connect clients directly to servers, including those

See **Banyan**, *page 19*

BRIEFS

The **SunService Division of Sun Microsystems, Inc.** plans to unveil this week an enhanced support program that includes both dial-up on-line support and a revamped CD-ROM subscription with documentation and support.

SunSolve Online provides access to Sun support personnel via the Internet and includes a bulletin board system that is a Usenet group, said Henry Wright, SunService senior product manufacturing manager.

Sun is also implementing **SunSolve EarlyNotifier,** on-line alerts to SunSupport subscribers about potential technical problems, often involving particular equipment combinations, along with troubleshooting suggestions. Support contract rates vary by configuration, but parts of SunSolve Online are open to anyone with Internet access. SunSolve Online is located at **hhtp://sunsolve1.sun.com** on the Internet.

SunService: (415) 960-1300.

Combinet, Inc. last week introduced the Everyware 1000 family of **ISDN LAN adapter cards** for central office, small office and home office users. The Everyware 1000 cards provide LAN access over ISDN Basic Rate Interface lines at transmission speeds of up to 512K bit/sec via hardware-based compression. The cards offer multilevel authentication and callback security, remote management and on-demand dial-up. The adapters emulate Ethernet adapters using Novell, Inc.'s Open Datalink Interface and Microsoft Corp.'s Network Driver Interface Specification software drivers. The cards will be available in March starting at $499.

Combinet: (800) 967-6651.

Sytron Corp. last week released Sytos Premium 2.1 OS/2, **backup and disaster recovery software** for IBM OS/2 Warp and IBM LAN Server 4.0. Sytos Premium features a Presentation Manager user interface for file selection and job execution, and Sytos Rebound, a utility that protects OS/2 Warp workstations and servers from total system failure.

Sytron: (800) 877-0016.

Novell seeks right support mix for users and resellers

BY KEVIN FOGARTY

Provo, Utah

When Novell, Inc. two weeks ago announced that it would offer more flexible corporate licensing plans and direct technical support, it acknowledged that to reach beyond the departmental LAN market, it would have to treat enterprise-level customers better.

Analysis

The new plans go a long way toward answering user complaints about licensing and support (*NW,* Jan. 23, page 1). But they also break a long-standing arrangement under which resellers had incentive to sell NetWare because Novell agreed not to compete with them for NetWare support dollars.

"Novell recognizes that as it moves up the ladder to try to address more complex enterprise networking issues, it has to be prepared to do a better job of holding the hands of its customers," said Jeff Kaplan, director of Dataquest Worldwide Services Group in Framingham, Mass. "But it's in a difficult position with respect to the resellers. Novell has succeeded in the past by making sure its resellers succeed, and it has to be careful about turning its back on that mechanism."

Novell protected its channel by splitting the difference between its traditional support model, under which Novell farmed out nearly all technical support to resellers, and that of WordPerfect Corp., which Novell bought last year and whose technical support has won customer praise for years.

Novell/WordPerfect users have been incredibly anxious to see how Novell's support efforts would change in light of the acquisition, said Kurt Johnson, an International Data Corp. analyst in Framingham.

The plan Novell finally came up with added two new paid service plans and two new licensing plans but kept the resellers in the mix by letting them sell the plans. Resellers will continue to offer their own support services, as well.

"This is not one model of support gobbling up the other," said John Lewis, senior vice president of support at Novell. "We tried to find a balance between the intense desire of major accounts to have a close relationship with Novell and the reseller channel."

Kaplan called Novell's approach "conservative."

Reality Check

Product: Novell
Company: Licensing and support plans

The benefits:
- Discounts for volume and site licenses.
- Site license allows for head count changes.
- More direct support from Novell.
- Less expensive per-incident support.

The drawbacks:
- Still too much reliance on resellers.
- CLA and VLA available only from small number of resellers.
- MLA support still restricted.
- Premium Support entry point too high.

The user view:
"They don't want to work with you. We were throwing a check at Novell and saying, 'We want you to design our [NetWare] 4.0 structure,' and they wouldn't do it."
Scott Kosits

FULL SERVICE

The two new corporate service plans are: Priority Service, in which users can buy phone support by the minute or by the incident; and Premium Service, which supplies fast access, high-level support through a dedicated account manager. Pricing for Premium plans begins at about $20,000 per year; the Priority plans start at $2,000.

Two new license agreements come with hefty discounts off the list price of Novell products. The discounts add up to only about a 5% savings over the product's street price, according to Ron Heinz, vice president of major market sales for Novell.

The license plans add more flexibility, but the technical support plans still favor resellers too much and lack high-end support, said Scott Kosits, network engineer for the Cleveland Clinic Foundation in Ohio. Novell should let midsize companies join its Master License Agreement plan, which gives Novell's Fortune 100 customers access to high-level consulting and other direct support, he said.

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Windows Connectivity Forum

Giving Windows for Workgroups a workout

Ever wonder if it would be possible to use Windows for Workgroups (WFW) 3.11's real-time Chat feature outside of a WFW LAN? Well, there are several options.

For one, you can use Microsoft Corp.'s 32-bit TCP/IP stack (formerly called Wolverine) to utilize the Chat feature over the Internet. You must have a direct connection to the Internet and use a mechanism for NETBIOS name-to-IP number conversion. You also must choose either the lmhosts file or WINS server to establish the link. Both parties in a two-way conversation must use the same mechanism, and, if using a WINS server, both parties must use the same server.

You can extend this concept by using Windows NT 3.5 Workstation Remote Access Services (RAS) to dial in to an Internet access provider, and then using Chat to connect to a WFW 3.11 user behind a TCP/IP router attached to the Internet.

Several WINCON members have begun to advertise their Windows NT 3.5 servers as being available to test this type of chatting over the Internet.

By Joel Diamond
Technical director

WUGNET
Windows User Group Network
76702.1023@CompuServe.com

WINCON's WFW SURVEY

I would like to invite *Network World* readers to drop by WINCON and share your first-hand experiences in configuring WFW 3.11 LANs with more than five nodes. If you have discovered that supporting a network of five peers becomes a headache to manage, have you considered dedicating one of your peer nodes as a server?

Do you select the system with the most raw horsepower or the least used workstation? What kind of performance and support experiences can you pass on to other LAN administrators dealing with a new WFW network?

TIP OF THE WEEK

Windows NT 3.5 users running Microsoft Mail have shown interest in installing Simple Mail Transfer Protocol gateways to link their Microsoft Mail post offices to TCP/IP-based SMTP servers.

If you have tried to install Microsoft's SMTP Gateway for DOS 3.0, you know that the gateway will not operate on Windows NT. The gateway is based on a DOS sockets implementation, while Windows NT will only support a WinSock interface. We have heard that a beta version of Microsoft's SMTP Gateway for Windows NT, called SMTPGATE.ZIP, is available on the Internet but have yet to test it.

Supposedly, it runs as a service on Windows NT and will allow Microsoft Mail for Windows NT to operate with an SMTP gateway. Be forewarned, however, that the program is said to be a memory hog.

IN A HAYES

For readers of WUGNET's *Windows Connectivity Secrets*, you are bound to come across our recommendation for enhancing your Windows communications performance — adding the Hayes Microcomputer Products, Inc. ESP I serial card to your personal computer. We have to apologize about making this recommendation.

Technically, before WFW 3.11 was released, we believed the high throughput that the ESP I card provided was worth mentioning. But one of our forum members tried to configure his WFW RAS to work with the card and discovered that it would not work. Even Hayes' ESP II card will not work with RAS.

Hayes has not released updated compatible WFW drivers for the ESP I card, and it is unclear whether such drivers will ship with the ESP II cards. It does not make you look real forward to an ESP III card, if one is planned.

CompuServe®

To participate on the Windows Connectivity Forum, type **Go Wincon** at any **!** prompt on CompuServe. For those of you who are not CompuServe subscribers, *Network World* and the Windows Users Group Network are offering a free membership sign-up by calling (800) 524-3388. Ask for Operator 426.

Banyan

Continued from page 17

on the Internet, over TCP/IP. It also will let the clients connect to a Banyan VINES or Enterprise Network Services server running Banyan's Server-to-Server TCP/IP, an add-on product that lets Banyan servers talk to one another using TCP/IP instead of Banyan's proprietary VINES IP network protocol.

The new product will let users run a single TCP/IP stack on all their servers, rather than running both VINES IP and TCP/IP.

The stack does not cut Banyan clients loose from Banyan servers, however. Clients have to connect to a VINES server running the VINES Server-to-Server TCP/IP Option to use the client-based IP stack, said Ken Volpe, product manager for the Banyan TCP/IP products. Banyan plans to make the stack available on ENS servers, as well, but Volpe declined to say when.

The Banyan Enterprise Client for TCP/IP costs $495 individually and comes bundled with the VINES Server-to-Server TCP/IP Option for $1,995. It is free to customers of Banyan's VIP extended support plan.

Banyan will complement the protocol stack with a new set of applications, dubbed the TCP/IP Applications Suite for Windows, DOS and OS/2. The suite features E-mail, a NFS Client, NFS Server, telnet support, TN3270 emulation and IP routing at the client. It also supports the Point-to-Point Protocol, Serial Line Internet Protocol (SLIP) and Simple Network Management Protocol, as well as the IBanyan and EBanyan protocols.

The suite, available now, costs $4,995 for a 50-user license or $2,795 for a 20-user license. Upgrades from FTP Software's PC/TCP EBanyan/IBanyan product cost $1,495 for 50 users. Banyan VIP customers can get a 50-user license for $795.

✆Banyan: (800) 222-6926.

NET RESULTS

by Mark Gibbs

Your ethics in doubt? Just say no

Do you believe that people in the computer world are dishonest? Do you think PC users are dishonest? How about network managers?

According to a report issued by the Software Publishers' Association (SPA) last year, around $7.4 billion worth of software worldwide was purloined by illegal duplication and use. In the U.S., it was estimated that about one-third of the software in use has been illegally acquired.

So if users are going to be dishonest, what are vendors to do? Copy protection schemes are a choice, but I believe they are a poor idea.

Vendors do very little to protect low-end software for one simple reason — it is not cost-effective. If your margin on a copy is in the order of a few bucks, one support call effectively removes all profit from a number of sales.

At the top end — those applications running $10,000 or more — my impression is that vendors rarely bother with copy protection either.

But in the mid-range, we have applications that cost perhaps $200 and up, and here we see all sorts of copy protection schemes that rely on software or hardware mechanisms.

While I understand vendors' desire to protect their products from illegal use, I feel antipiracy measures are pretty much a waste of time. If a user is determined to swipe software, he will find a way.

But the worst aspect of copy protection is that these techniques are rarely robust. When they go wrong, they can be inconvenient at best by, for example, requiring you to reinstall the software. At worst, when a protection scheme goes wrong, it may require a new copy of the product or hours on the phone with the vendor's technical support staff to sort things out.

I was reminded of my distaste for copy protection schemes a few days ago when I tried to use some software that I was reviewing. I installed the application and then tried to run it, but the application said I had a licensing problem and shut me out.

It turned out that I had been sent disks with a bad software build or something equally lame, and it was a problem that was easily solved. But it required calling the vendor, getting new disks and falling two days behind my schedule.

The worst part of it was that the software is priced at just a couple hundred dollars and only runs on network file servers. Where is the sense in botching up a package like that with a copy protection scheme?

The vendor told me copy protection is company policy, but the inconvenience to me and the cost to the vendor — such as fielding the support call and shipping out new disks — makes it look none too smart.

It also looks as though the vendor lacks faith in network managers — the primary audience to which it sells.

Now I do not want to single out this vendor (so I have refrained from naming it). This company is not the only one using such systems to try to protect a product.

For example, at a higher level of the network, one large network operating system vendor has a hardware-based copy protection scheme for its server software components that requires you to fiddle around with little buttons that lock into a plug on a server serial port. That is some vote of confidence for the ethics of net managers.

I would have no problem with a copy protection scheme that was completely transparent. If there was a scheme that did not require things hanging off ports and entering complex codes, I would have no objection.

So while vendors might be concerned about the ethics of the PC population in general, it is time to realize that net managers are quite different.

Net managers are more responsible. Besides, no network manager is going to compromise his or her job over a couple of hundred, or even a few thousand, dollars worth of software.

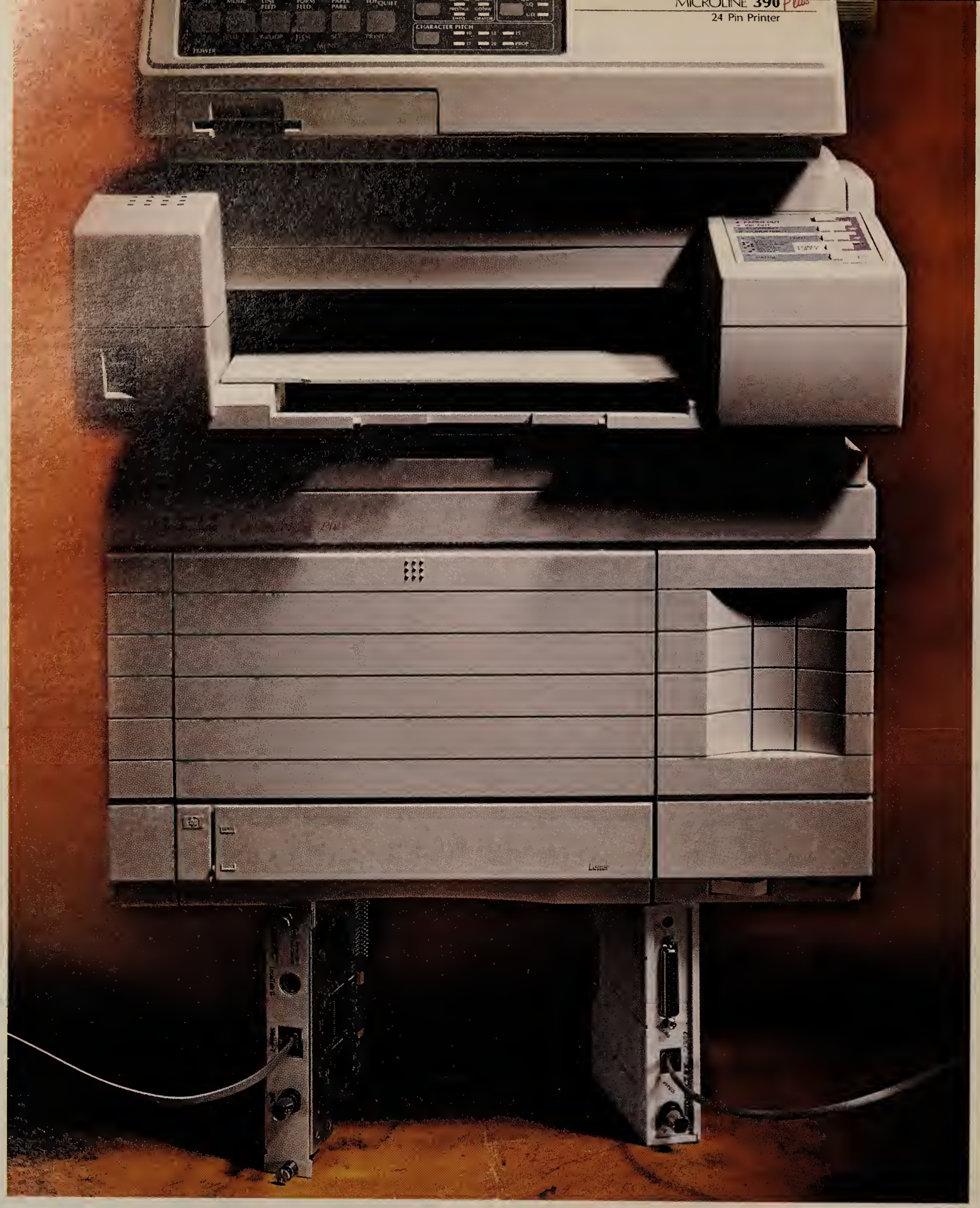
I would recommend that if one of these schemes is used in a network product, do not buy it if you can possibly avoid doing so. Net management is hard enough without an unnecessary technique that can go wrong.

Copy protection? Just say no.

Better safe than sorry

Want to ensure that your network has legal, licensed copies of software? Give the SPA a call at (202) 452-1600, or fax it at (202) 223-8756, to inquire about the group's free self-audit kit.

➔ Gibbs is a consultant and writer in Ventura, Calif. He can be reached at (800) 622-1108, Ext. 504, or on the Internet at mgibbs@gibbs.com.



BEST OF TIMES 1994 LAN TIMES

JetDirect EX External print servers support any parallel-based printer. JetDirect cards support HP LaserJet, HP DeskJet and HP DesignJet printers with I/O slots

NOS compatibility: Novell NetWare; IBM LAN Server; Microsoft LAN Manager; Apple EtherTalk; Apple LocalTalk*; Windows NT; Windows for Workgroups; UNIX: HP-UX, SunOS, Solaris, IBM AIX, SCO UNIX, lpd**

Network compatibility: Ethernet: 10Base-T, 10Base2; Token Ring (4/16 Mbps); Apple LocalTalk*

Multiple protocols with automatic switching

Software management utilities such as HP JetAdmin and HP JetPrint†† for NetWare and UNIX for easy printer installation, remote status and management

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PC MAGAZINE EDITORS' CHOICE
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Out of its shell

The Newton MessagePad is getting talkative. Expected in the first half of this year:

- **RF packet modems for ARDIS, Metricom and Mobitex (RAM) nets**
- **Analog and digital cellular modems**
- **Spread spectrum-based LAN links**
- **One-way paging and news services**

GRAPHIC BY SUSAN J. CHAMPENY

Apple beefs up Newton PDA

BY JOANIE WEXLER

Cupertino, Calif.

Apple Computer, Inc. today plans to announce a new version of its MessagePad personal digital assistant (PDA) that expands the internal memory of its predecessors and will soon gain cellular, packet radio and wireless LAN communications options.

A $699 version of the Newton-based MessagePad 120 will carry 2M bytes of memory, up from 1M byte available on the existing MessagePad 100 and 110. The optional extra megabyte frees the device's PCMCIA slot for functions such as communications, said Susan Schuman, manager of Apple's Personal Interactive Electronics division.

The company will also unveil a $599 version of the

See **PDA**, *page 22*

Court ruling changes rules in tariff game

BY DAVID ROHDE

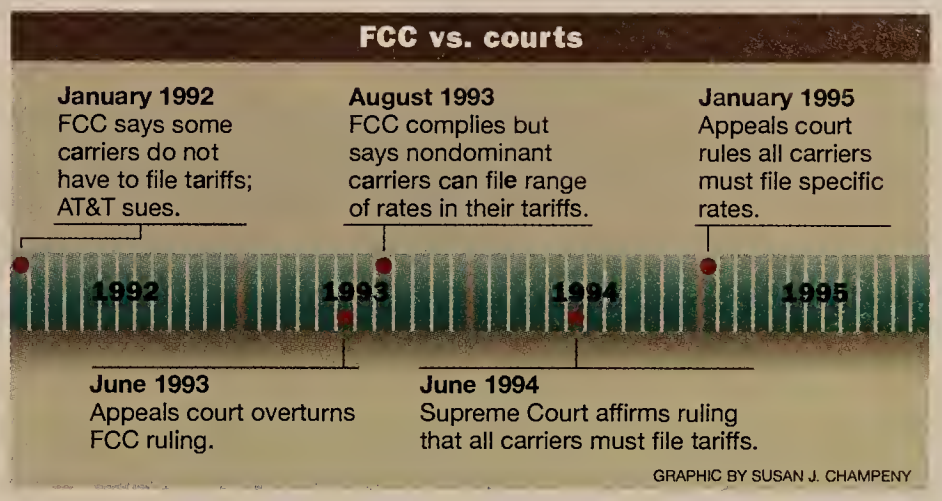
Washington, D.C.

In a ruling that may have mixed results for users, the U.S. Court of Appeals here has decided that all carriers will soon have to file with the FCC the actual rates they charge for interstate services.

The ruling overturns the Federal Communications Commission's policy of allowing long-distance carriers other than AT&T to state a range of rates for their services such as 10 to 20 cents a minute for a particular offering.

The ruling appears to sound the death knell for the FCC's goal of reducing the tariff burden on carriers. It leaves the commission no recourse but to ask Congress for the right to reduce the tariff requirement — a course that seems likely in this year's effort to rewrite the Communications Act of 1934.

FCC vs. courts



GRAPHIC BY SUSAN J. CHAMPENY

For users, the ruling is a double-edged sword. Although it means full disclosure of rates for long-haul switched and dedicated services, it may reduce negotiating room in working out special deals with carriers.

That's because smaller carriers probably will have to write their contracts in such a way that they offer discounts or credits against specific tariff rates, much the same way AT&T does in its nearly 2,000 contract tariffs. Right now, smaller carriers try to win business by offering a negotiated rate.

The immediate impact is on users now in the process of signing a contract with carriers, said George David, publisher with the Center for Communications Management Information in Rockville, Md. "If you're negotiating a deal right now, you may find yourself in a less than attractive position," he said.

In three to six months, David said, carriers are likely to have worked out standard promotions or discount contracts that bring the effective rate of services back down.

Now these discount contracts will have to be filed with the FCC, as well. The biggest carrier this affects is Sprint Corp., since AT&T files all of its contract deals and MCI Communications Corp. files most of its, said Hank Levine, a partner in the Washington, D.C. law firm Levine, Blaszak, Block & Boothby. "Sprint has been hiding in the weeds. Now they'll have to file hundreds of [contracts]," Levine said.

In the short term, carriers may file a greater number of rate plans to make more of a distinction among different classes of customers, David added.

Also, because most tariffs other than AT&T's are allowed to take effect with one day's notice and are not reviewed, some will contain "grotesque errors," Levine said.

Significantly, the ruling does not address the issue of whether so-called enhanced services — notably, fast-packet services such as frame relay — must be tariffed. But the FCC has set a rapid cycle for ruling on a petition asking that AT&T be forced to file frame relay rates.

OUTSOURCING OPTIONS

Bell Atlantic offers array of mgmt. services

BY TIM GREENE

Washington, D.C.

Bell Atlantic Corp. will enter the remote network monitoring market this quarter with a four-tiered service designed for large and midsize businesses that want to outsource net management and support tasks.

The offerings, announced at ComNet '95 here last week, each addresses a different piece of the management puzzle. Services range from WAN monitoring and management to evaluation of LAN efficiency, allowing users to choose which functions they want to outsource.

With its first offering, WAN Management Services, Bell Atlantic provides a help desk, router-to-router monitoring, service maintenance, analysis of WAN performance and planning for net capacity. The carrier also coordinates activities among equipment vendors, interexchange carriers and other regional Bell operating companies.

The Enterprise Network Management Service includes vendor coordination, net monitoring and problem resolution, as well as analysis of network efficiency. Bell Atlantic will monitor the net down to the users' LAN hubs initially, but the carrier plans to extend the service to the desktop, according to Rick Mace, vice president of marketing for Bell Atlantic Network Integration, Inc.

Under its Network Performance Engineering Service, the carrier will analyze network performance, troubleshoot problems and determine ways to maximize efficiency down to the workstation.

The fourth offering, Router Central, lets users hire Cisco Systems, Inc. and Bay Networks, Inc. certified engineers to install, maintain and upgrade routers.

The services will be offered to users of Bell Atlantic Telephone Co.'s fast-packet and private lines. Pricing will depend on the number and location of user sites. Full-time monitoring of a router will cost $300 to $500 per month, while the cost for monitoring a hub will be $75 to $150 per month, Mace said.

The company is taking on a market already occupied at the high end by heavy hitters, including AT&T, IBM, EDS Corp. and Andersen Consulting.

But there may be room for more players, as the market shows promising growth potential. Bell Atlantic estimates the current market at $2 billion, with 22% annual growth.

At the low end, Bell Atlantic will compete with Interprise Network Services, a subsidiary of US WEST, Inc., according to Jeffrey Kaplan, director of Dataquest Worldwide Services Group in Framingham, Mass.

"Despite significant obstacles to success, Bell Atlantic is making the type of investment in [the new service] that will make it a player worth watching in 1995," Kaplan said.

BRIEFS

The **Frame Relay Forum** last week said it has completed the frame relay-over-Asynchronous Transfer Mode permanent virtual circuit interworking implementation agreement with the ATM Forum. The specification provides a standard way to transport frame relay data and control information over an ATM backbone.

Network service provider **EMI Communications Corp.** and two partners last week launched a service dubbed USWeb, a commercial community on the Internet for **facilitating electronic commerce.** In conjunction with electronic publishing company One World Interactive and consulting firm Aule-Tek, EMI said it is delivering business support services via a mix of sound bites, video clips, graphics and hypertext information. A one-year membership costs $2,500.

EMI: (315) 433-0022.

Sprint Corp. has asked the FCC to mandate restrictions on **800-number assignment** that are currently issued as voluntary guidelines by the Industry Numbering Committee. The guidelines say carriers can make 60-day reservations for individual 800 numbers only if they have a specific customer in mind for that number, and customers are supposed to surrender dormant 800 numbers after one year.

Mandatory enforcement of these rules with legal penalties is needed, said Sprint attorneys in the FCC filing, citing a recent *Network World* report that a Bell Communications Research subsidiary expects the 800 numbers to run out within a year (Jan. 9, page 1).

Last week, **Sprint Corp.** announced a cellular enhancement to its **Fonview billing package.** Customers need only provide Sprint with the names of their cellular service providers, then the carrier works with the providers to receive and compile the customer's billing information. Once complete, Sprint sends a monthly diskette or CD-ROM with all the cellular billing information.

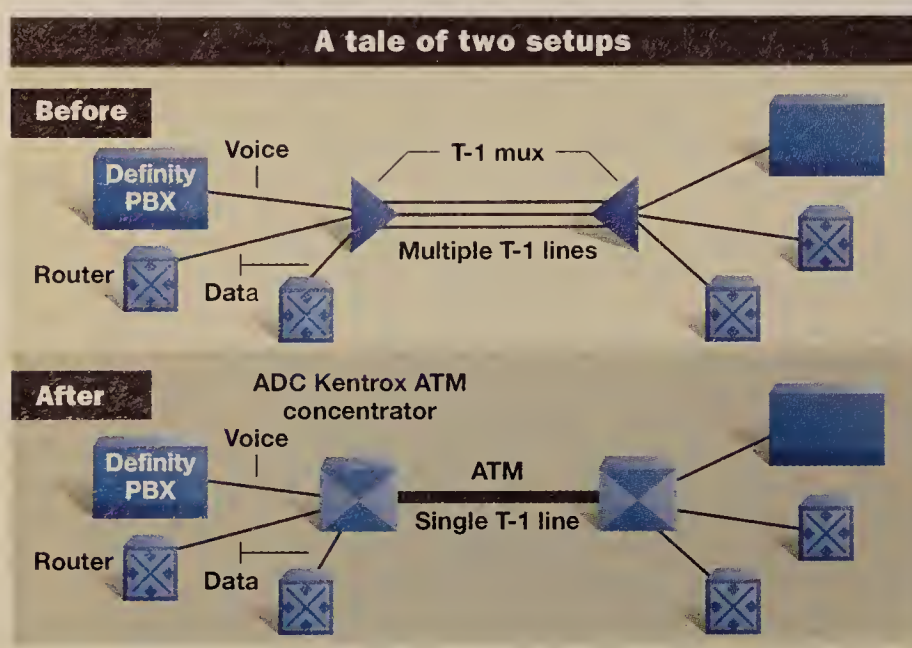
AT&T takes stab at adding voice to its ATM mix

BY JOANIE WEXLER

Washington, D.C.

AT&T took its first tottering steps toward merging customers' voice traffic onto Asynchronous Transfer Mode nets at last week's ComNet show here.

In a show floor demonstration, the company used an ATM concentrator from ADC Kentrox to blend Ethernet-based data coming from a router with voice traffic from its Definity private branch exchange, sending both over the same T-1 line (see graphic).



In a ComNet demo, AT&T showed how the bandwidth utilization features of ATM technology could help heavy data users pare down the number of leased T-1 lines required as compared to using traditional T-1 muxes.

GRAPHIC BY SUSAN J. CHAMPENY

According to AT&T spokeswoman Susan Barbier, consolidating voice and data using the efficient ATM protocol allows users to squeeze six to eight T-1s' worth of traffic onto one T-1 line.

The efficiencies come on the data side (and from store-and-forward video, which is represented as data) because, so far, there is no standard for interleaving delay-sensitive voice as ATM cells in a statistically multiplexed manner. This means that the voice still rides in circuit-switched mode, explained George Ryva, networking technical manager at AT&T Bell Laboratories, who participated in the demonstration.

PIQUING USER INTEREST

The ATM multiplexer front-end setup could bode well for a company like Stone & Webster Engineering Corp. in Boston. The AT&T user has a nationwide T-1 private-line network "that is chock-full," said Alfred Martino, manager of corporate telecommunications at the firm.

Martino has investigated moving to a public frame relay service, but at this juncture, investing $250,000 to $500,000 in routers and other frame relay equipment "is not palatable."

Jerry Schrott, manager of communications at Children's Hospital Medical Center in Cincinnati, would prefer to eventually have his Definity PBX and an ATM switch merge into one. Today, he runs 3270, Ethernet, asynchronous and synchronous data, as well as imaging and voice, through his PBX.

"But the standards aren't in place yet for full-motion video over ATM," he said. "AT&T cringed when I asked them about running video through my Definity."

AT&T said, though, that the ATM multiplexer setup is the tip of the iceberg in its PBX/ATM endeavors but refused to detail future plans. The ADC Kentrox ATM T-1 Access Concentrator, which AT&T said it now will purchase for its customers, represents the first time AT&T has blended ATM customer premises equipment into its users' private-line networks, Barbier said.

PBX competitor Siemens Rolm Communications, Inc. performed a similar demonstration at the CeBIT show in Hannover, Germany, last year.

PDA

Continued from page 21

Model 120, which like the more expensive model, features design enhancements such as a removable lid and improved display.

Apple said modems are also en route for the MessagePad in the first half of this year — both in the PCMCIA form factor and as external peripherals — from AT&T Paradyne, Dayna Communications, Inc., Ericsson GE, Motorola, Inc. and others (see graphic, page 21). That will address a major shortcoming for the PDA market as a whole, as users seeking the portability of a PDA tend to be mobile and in need of such flexible communications (*NW*, Jan. 23, page 32).

A SALES LEMON

The MessagePad, about 100,000 of which are currently deployed, has been frequently labeled a lemon in terms of sales. At previous prices of about $1,000 and with limited or unreliable communications functions, the device and its competitors have been viewed as expensive personal organizers rather than as nodes on enterprise nets.

"PDAs have been long on promise but short on delivery," said Githesh Ramamurthy, chief technical officer at CCC Information Services, Inc., a technology services firm that automates vehicular claims processes for insurance companies.

And while Ramamurthy applauded Apple for upping the storage capacity, 2M bytes doesn't scratch the surface of CCC's needs for mobile claims applications. "We have 600M bytes in our entire collision estimating database," he said.

CCC instead uses Toshiba Corp. and NEC America, Inc. laptops for their larger disk space.

To accommodate high-power modems for radio, spread-spectrum and other networks, Apple doubled the MessagePad's PCMCIA slot power rating.

Dayna's forthcoming spread-spectrum PCMCIA adapter will allow mobile users within a building or campus to wirelessly link to their AppleTalk LANs. Meanwhile, cellular adapters will allow users to plug in their AT&T, Motorola, Nokia Mobile Phones, Inc., OKI Telecom and other cellular phones, and send data over circuit-switched analog links.

That is a selling point for Iain Gillott, manager of wireless communications at Link Resources Corp., a consulting firm in Framingham, Mass., and a beta tester of the 120, because the cellular network is the most ubiquitous.

"I go to some pretty weird places" where newer packet radio nets are likely to have coverage gaps, he said.

Comments?

See "How to reach us" on the back page.

RATE & TARIFF MONITOR

by Eric Paulak

Court's tariff decision lets you compare apples to apples

A federal court of appeals has ruled that all carriers that are regulated by the Federal Communications Commission must file tariffs with specific rates, not just high/low rate bands.

Regardless of what anyone might tell you, this is good news for end users.

Why? Specific rate filings give you everything you need to objectively look at two carriers and decide which one offers the best rates.

With rate bands, you have no idea how much you're actually going to pay for a service until you put the contract out to bid.

And, as an added bonus to this ruling, all carriers that offer negotiated deals now have to file the specifics of the deals, just as AT&T does with its contract tariffs and MCI does with its Special Customer Arrangements (SCA).

But, of course, not everyone is happy about this ruling. The naysayers argue that filing specific tariffs limits an end user's ability to negotiate the best deal for their company.

In reality, that's a lot of hooey.

The only ones making the argument that rate bands promote better deals are the ones who file rate bands.

If specific rates limit your capability to negotiate a great deal, then why is it that users have signed more than 2,000 contract tariffs with AT&T and MCI customers have signed nearly 800 SCAs?

The answer: Specific rates don't limit your options because contract tariffs let you negotiate for anything you want.

The best examples of what negotiating can do for contract tariffs are the AT&T CustomNet, Option S, deals that were filed last year.

For instance, with a commitment of as little as $200 a month, AT&T was offering outbound rates of $.164 per minute.

Many businesses get a rate better than $.164 per minute with their own service plans, but they also have to commit to at least 10 times as much in monthly revenue.

So if AT&T — the most regulated of all the phone companies — can offer great deals even though it files specific rates and if its users can receive great deals with very little financial clout, there is absolutely no reason that the carriers that currently file rate bands will not be able to offer the same great deals after they have filed specific rates.

In fact, the more specific rates are available, the greater the competition will be if users play the carriers off each other.

For example, say an MCI customer is negotiating a new SCA and shows the MCI sales rep a copy of a similar contract tariff that Sprint has filed.

MCI's either going to match the deal, or the user's going to go to Sprint and sign on to the better deal.

But don't look for any contract tariffs from Sprint or unbanded rates from any other carriers for a while.

The court of appeals just ruled on the situation on Jan. 20, and the FCC has yet to say if it will appeal the decision or issue an order upholding the ruling.

Don't look for any contract tariffs from Sprint or unbanded rates from any other carriers for a while. The court of appeals just ruled on the situation on Jan. 20.

And even if the commission requires all carriers to file specific rates, including for all of their negotiated deals, the Republican congress may turn around and throw out the tariff filing requirements with the upcoming telecom legislation.

If that happens, it will truly be a shame because, just like in any other industry, if a customer wants the best deal, he has to do some comparison shopping.

But, unlike other industries, it's rather hard to comparison shop if some of the sellers don't have their rates displayed.

Paulak is associate publisher for the Center for Communications Management Information (CCMI), a provider of rate and tariff information in Rockville, Md. This is his last Rate & Tariff column for *Network World* due to Paulak's increased responsibilities at CCMI. If you would like to keep up with the latest in telecommunications rates and tariffs, contact him at (800) 929-4824, Ext. 327.

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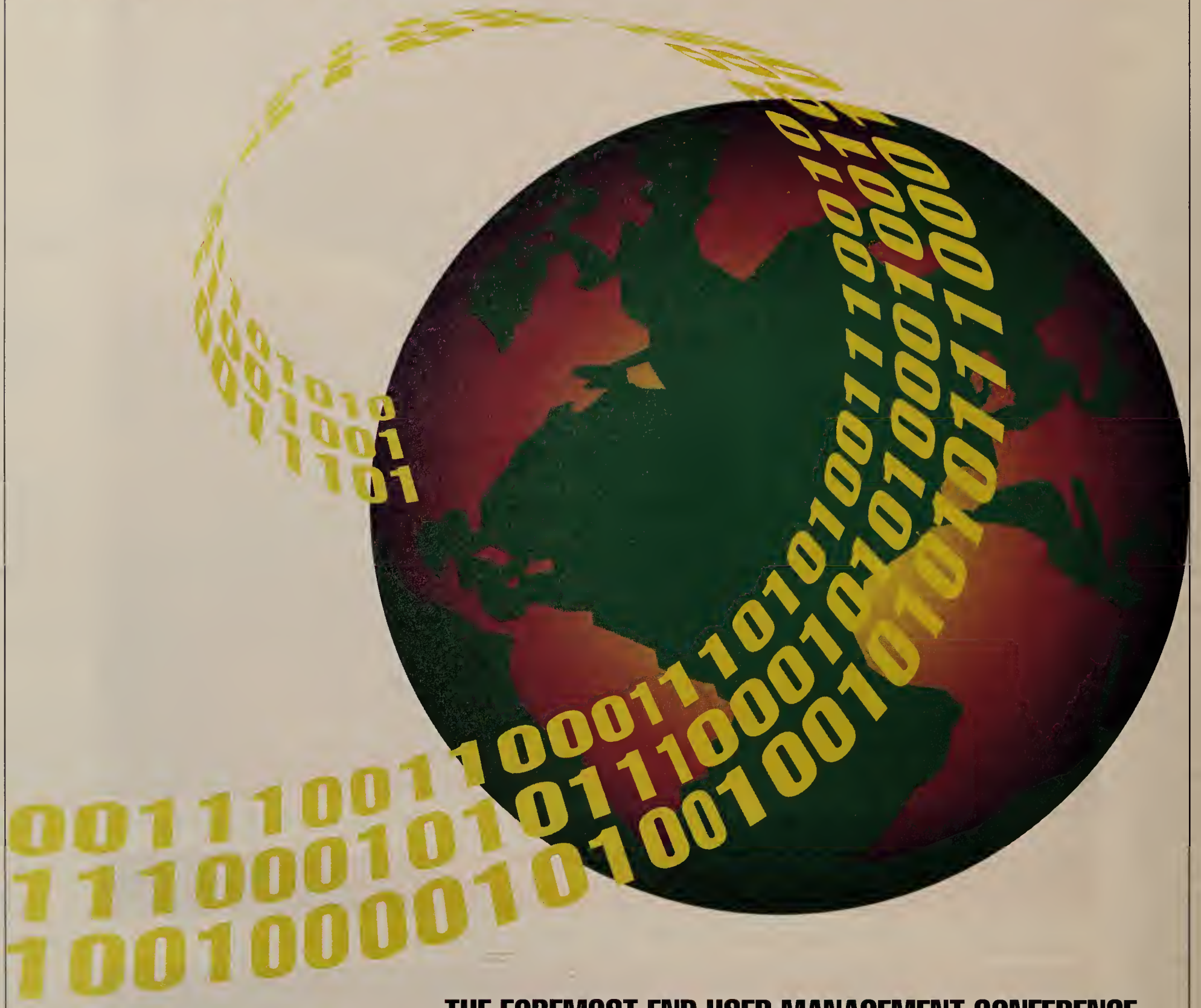

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Lotus Notes being put through its paces by military

BY ADAM GAFFIN

Orlando, Fla.

The U.S. military is increasingly looking to Lotus Development Corp.'s Lotus Notes groupware as a tool for information-based warfare.

This may sound incongruous at first, given that Notes is touted for promoting team decision making, while the U.S. military is one of the most hierarchical organizations in the world.

But as intelligence gathering becomes more vital to national defense, the military needs to consider tools such as Notes to speed the dissemination of information — even at the risk of some flattening of its traditional chain of command — said John Saunders, a professor of information and decision systems at the Washington, D.C.-based National Defense University, whose students are mainly colonels and lieutenant colonels. At last week's Lotusphere conference for Notes and cc:Mail users and developers here, Saunders spoke about fitting a groupware package into the military.

Six months ago, the university began installing a Notes network that today includes three servers and 400 clients, most of them Windows-based. Several other military departments and units, including the Secretary of Defense's office, now also use Notes, as does the Central Intelligence Agency, Saunders said.

Even Newt is taking Notes.

One application deployed at the school is a discussion database in which students can debate how to deal with a military and political crisis in an imaginary country — complete with fictitious wire service stories and data from the State Department.

But Saunders said the military and intelligence community is beginning to use Notes for distribution of real information on overseas crises. A Notes-based national security information network is probably not far away, he said.

Notes met early resistance by some people within the university community. But those promoting Notes created Notes databases that students and professors have to use — for example, a database holding the professor evaluations that students must fill out and professors must read.

One faculty member who has had little trouble adapting to the new software is House Speaker Newt Gingrich (R-Ga.), who teaches a class on "visionary leadership." Saunders said Gingrich has Notes installed on a laptop computer, which he uses from Capitol Hill to replicate databases with one of the school servers.

The university generally is pleased with Notes, Saunders said. However, the software could benefit from stronger filtering systems for picking important nuggets of data out of increasingly large information flows. In the information wars of the future, that could prove vital, he added.

Notes 4.0, due around midyear, is a step in the right direction, Saunders said, as it will better support video clips and other multimedia objects.

How to stretch your client/server dollars

Implementing standards, leveraging end-user know-how can help clip costs.

BY BARB COLE

Much ink has been spilled heralding the huge sums of money to be saved by downsizing host systems to client/server nets. But short of unplugging pricey mainframes and dropping costly software licenses, there are lots of things companies can do to save money on client/server projects.

"The problem with client/server is that there are too many ways to do things. That's where you wind up wasting money," said Corey Isaacson, president of CompuFlex International, Inc., a systems integrator in Los Angeles that specializes in client/server projects.

According to Isaacson and others, implementing programming standards is the key to keeping client/server projects in the black.

Isaacson recommended adopting a graphical user interface standard, a coding standard for server-based programming, a methodology for how to prototype applications, and documentation standards.

Doing so saves time and money, he said.

Gene Friedman, vice president of applied technology at The Chase Manhattan Bank, N.A. in New York, agreed.

"Being standards-based is guaranteed to save you money — if not initially, then on support," he said. Friedman stressed the importance of both hardware and software standards in a distributed, client/server environment.

"You never know when you're going to want to put the application into a very small place or a very large place. You make an application scalable by picking a flexible tool, having [hardware and software] standards and designing a modular application," he added.

FRONT-END REALIGNMENT

While application development tools tend to be relatively inexpensive, they can have a major impact on overall costs. Steep learning curves can result in delays and cost overruns, according to client/server veterans.

Choosing a development tool for which there is a wealth of third-party code libraries can help keep costs in check.

"A good library will save both development time and design time," Isaacson said.

Some users are taking more radical approaches to cutting the costs associated with application development.

Walt Hultgren, manager of information systems (IS) for Yerkes Primate Research Center at Emory University, in Atlanta, is teaming IS staff with key people in the end-user community to leverage the users' knowledge of their individual applications.

"Instead of just doing technical interviews or needs analysis, I'm actually letting [users] engage in some iterative development steps under the watchful eye of IS personnel," Hultgren said.

"Outsourcing" application development to technically proficient end users will save money and improve turnaround time, he said.

Pushing development down to individual departments could prove to be an inexpensive way for the university to meet its client/server deadline, he added.

AUTOMATE, AUTOMATE

Chuck Sauer, who works as a manager of network support and development at Motorola, Inc. in Tempe, Ariz., learned that large client/server systems cannot be manually maintained on a budget, as could mainframe systems.

For client/server applications to work, you need to build automated backup procedures into them — the tools needed to manually monitor client/server systems either do not exist or are very expensive, Sauer noted.

Client/server on a budget

- **Standardize on a GUI, prototyping methodology and documentation.**
- **Start small; large applications generally require a big server and a pricey software license.**
- **Team developers with end users to leverage the expertise of each.**
- **Use tools that do automatic backup and recovery.**

BRIEFS

Sybase, Inc. of Emeryville, Calif., last week rolled out two new **consulting services** to help customers build client/server systems and hired a vice president of worldwide consulting.

Several relational database vendors, including rival Oracle Corp., have boosted their consulting divisions and seen revenues soar.

Michael Bealmear, a former senior vice president at SHL Systemhouse, Inc., will head Sybase's professional services arm.

The new Sybase consulting services include Sybase Architecture Framework for the Enterprise, a five-phase process for designing information systems; and Enterprise Work Architecture, a modeling technique for organizing computing resources. The services may be used together or separately.

Sybase: (510) 922-3500.

Computer Associates International, Inc. (CA) of Islandia, N.Y., has begun shipping database drivers to several relational databases for its application development tool, **CA-Openroad.**

The drivers will let developers build applications using CA-Openroad that access data stored in CA-Ingres, Oracle Corp. Oracle7, Microsoft Corp. SQL Server and Sybase, Inc. System 10 databases.

CA has bundled these drivers as part of the CA-Openroad Success Pack, with pricing at $420 per user for a 16-user license on Windows NT.

In addition to the database drivers, the package includes the CA-Ingres/Net software that links client computers to servers, a precompiler, and a query and reporting tool.

CA: (516) 342-5224.

Cincinnati-based **Software Clearing House, Inc. (SCH)** last week said it will sell and support **Qualtrak Corp.**'s client/server defect tracking software.

The Distributed Defect Tracking System helps systems administrators track and measure the quality of software products by noting known defects in the software. Users may distribute defect information across a network, even to remote sites. A 10-user license costs $9,500.

SCH: (513) 579-0455.

Bachman Information Systems, Inc. of Burlington, Mass., last week said it lost about $1.4 million in the second quarter of its fiscal 1995 year, which ended Dec. 31, 1994.

The company posted revenue of $8.8 million for that period, about 7% less than revenue in the comparable quarter of fiscal 1994.

Once a mainframe software vendor, Bachman has been migrating its products and developing new computer-aided software engineering and application development tools for the client/server arena.

Bachman: (617) 273-9003.

Document mgmt. vendors forge Notes links

BY ADAM GAFFIN

Orlando, Fla.

Document management vendors used last week's Lotusphere conference here to announce new products designed to link their products with Lotus Development Corp.'s Lotus Notes.

Documentum, Inc. of Pleasanton, Calif., launched plans for its new Documentum Server for Lotus Notes, which will integrate Documentum's document management system with Notes.

The new server will let Notes users access compound documents stored across an enterprise and will link Notes databases to Documentum's versioning, workflow and other management functions. The server will also let Documentum users view Notes discussions linked to documents in the Documentum system. Ultimately, Documentum hopes to let companies using its client software participate in Notes discussions, as well.

Matt Shanahan, a Documentum vice president, said with the new server, documents will be stored in Documentum repositories but Notes users will be able to call them up or create hyperlinks to them as if they were Notes documents. When Notes users call up a document, they will be able to lock them to keep other users from working on them at the same time.

The server will periodically synchronize Documentum and Notes server databases, Shanahan added.

The new server is scheduled to ship in the second quarter for Sun Microsystems, Inc.'s Solaris, Hewlett-Packard Co.'s HP-UX and IBM's AIX servers. The Documentum software, which relies on a back-end relational database for storage, will support databases from both Oracle Corp. and Sybase, Inc.

Pricing was not announced.

Also at the show, PC Docs, Inc. of Tallahassee, Fla., announced plans for software to link Notes databases with its PC Docs Open Library document databases. PC Docs Interchange for Lotus Notes features agent software that monitors PC Docs Open Library databases for documents that match criteria set by users. The documents will then be converted into the Notes format and inserted into relevant Notes databases. Any changes in the PC Docs document are automatically replicated to the Notes database.

The software will ship in March; pricing was not announced.

Folio Corp. of Provo, Utah, meanwhile, demonstrated software aimed at linking its document databases with Notes. Folio Fusion, to ship in March, will give Notes users access to documents stored in Folio databases. Users also will be able to insert links to Folio documents inside Notes documents.

Pricing starts at $59 per user.

✆Documentum: (510) 463-6800; PC Docs: (904) 942-3627; Folio (801) 344-3700.

Around Lotusphere

More than 100 vendors last week announced products — from gateways to development tools — designed to work with Lotus Development Corp.'s Lotus Notes groupware package at the annual Lotusphere show. Among them:

■ Attachmate Corp. of Bellevue, Wash., has upgraded its Attachmate Zip/Office Server to link Lotus Notes, cc:Mail and Organizer users to IBM Professional Office System (PROFS) and OfficeVision VM calendaring applications. They will ship in the second quarter for $8,995 per server.

Attachmate: (206) 644-4010.

■ Worldtalk Corp. of Los Gatos, Calif., unveiled Worldtalk Directory Service Unit for Notes, which provides directory synchronization between Notes and several other proprietary messaging directories. The software runs on Hewlett-Packard Co.'s HP 9000 platform and will be available in the second quarter starting at $4,950 per server.

Worldtalk: (408) 399-4000.

■ Percussion Software, Inc. of Boston brought out Notrix Composer for Oracle, which gives Notes clients quick access to Oracle Corp. databases via OS/2-based Notes servers, for $4,995 and immediate availability.

Percussion: (617) 267-6700.

■ Informix Software, Inc. of Menlo Park, Calif., said it will roll out a NewEra Class Library for giving Windows applications access to Notes databases. The tool will ship in the third quarter; pricing has not been announced.

Informix: (415) 926-6300.

BY ADAM GAFFIN

HP and IBM both rev up broader desktop support on TP monitors

BY BARB COLE

Cupertino, Calif.

Hewlett-Packard Co. and IBM last week each rolled out new versions of their transaction processing (TP) monitors that support a wider selection of personal computer clients.

TP monitors manage the transfer of data between local and remote servers, as well as the client applications that access them.

HP's Unix-based CICS/9000 1.3 is about 60% faster than the previous version and now supports Windows and DOS clients. Previously, it only supported Unix desktops, according to Feisal Mosleh, HP product manager of distributed TP products.

The new version is more compatible with mainframe versions of CICS, providing a seamless interface to both HP and mainframe versions of CICS, which traditionally has controlled TP in IBM batch-oriented operating system environments, Mosleh said. The HP software is also tightly integrated with HP's MC/ServiceGuard, software used to create standby systems that come on-line in the event of a crash. HP also upgraded Encina/9000 1.1 to support Windows clients and the COBOL language application program interface. Previously, Encina/9000 supported only Unix desktops.

IBM GETS ITS CICS

Separately, IBM rolled out new CICS client software that lets OS/2, Windows, DOS and Macintosh clients access any CICS server. Previously, CICS clients could only access servers that ran the same operating system.

IBM also issued Unix versions of CICS, including CICS for AIX 1.2 and CICS for OS/2 2.01.

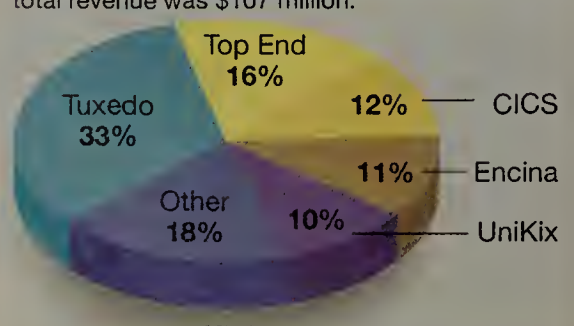
The company said the new versions are about three times faster than previous ones and are easier to configure.

HP Encina/9000 costs $150 for a single-user license and $45,000 for unlimited users. Pricing for HP's CICS/9000 ranges from $150 for a single user to $177,350 for unlimited users. IBM's CICS client software costs less than $50 per client and from $3,000 to $30,000 per server. All of the products are available now.

✆HP: (408) 725-8900; IBM: (301) 240-8143.

Monitoring the market

1994 worldwide Unix TP monitor market total revenue was $107 million.



SOURCE: THE STANDISH GROUP, DENNIS, MASS.
GRAPHIC BY SUSAN J. CHAMPENY

SHARED LOGIC

by Marc Myers

Examining IBM's Chantilly Study

In May 1993, Lou Gerstner, IBM's chairman and chief executive officer, hosted one of the first Customer Executive Conferences in Chantilly, France. These exclusive conferences give IBM's large customers a chance to directly voice their concerns and suggestions to the top guns at Big Blue. The conference and the so-called "Chantilly Study," which grew from the event, are particularly relevant to client/server development.

In Chantilly, IBM's leading customers insisted that IBM help them make sense out of client/server. Gerstner replied that if the customers were willing to work with him, he would get the answers they required. Thus began the "Chantilly Study," IBM's in-house name for the IBM Consulting Group's "Multi-Client Study."

Gerstner invited 24 companies from diverse industries to participate in an effort to discover and formalize the critical success factors that make or break client/server projects. Each invited company had already completed at least one client/server project.

One year later, in May 1994, IBM's research team delivered its results. While many interesting statistics were collected, the most compelling result of the effort centered on the notion of organizational readiness. IBM found that client/server success is directly proportional to a company's ability to find personnel who can deploy the technology correctly.

IBM discovered a principle often overlooked in the rush to deploy client/server: New technology is only as good as the people who program and configure it. For each major technical aspect of a new client/server project, success depends on the presence of an area expert who can function as key enabler, or technical leader. Curiously, the more sophisticated our automated systems become, the more we increase our dependency on such technical specialists.

Another significant finding was that client/server projects, coupled with business process reengineering efforts, have a higher success rate. With business process reengineering occurring as a part of project development, client/server systems not only can provide better access to data, but also a simpler approach to business process execution.

Based on the "Chantilly Study" results, IBM constructed a software-based system for internal use by IBM Consulting Services that analyzes the answers to a series of questions in order to score a company's likelihood to succeed in client/server development and deployment. Using this product, an IBM consultant can let a client know whether it is likely to succeed. It also tells clients which areas should be improved before initiating a client/server project.

There's only one problem with this product, code-named Client/Server Advisor: You can't have it.

It is the intellectual property of IBM Consulting Services and is considered far too valuable to let into the public domain, where every competing consulting company could reap the benefits of IBM's expensive and comprehensive research. While it is an understandable stance, I find it somewhat in contrast with IBM's efforts to promote open systems and connectivity between Big Blue and other systems.

Lacking access to IBM's automated tool, small to midsize firms are left — again — on their own. As IBM's stated goal is to reach out to these users, it would be ideal if Client/Server Advisor, or at least a watered down version of it, was available to them.

IBM would be better off making the tool available to anyone who wants to buy it. This would help solidify IBM's image as a multiplatform, open systems vendor. This way, smaller companies and branch offices could follow IBM's examples to improve their likelihood of client/server success.

⊸ Myers is president of Client/Server Connection, Ltd., a Cambridge, Mass., firm specializing in client/server software solutions. He can be reached at (800) 622-1108, Ext. 522, or via CompuServe at 71332,1726. Myers' column alternates in this space with that of META Group's Mike Rothman.

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April 11-13, 1995, New York City

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EDITORIAL INSIGHTS

Where the highway leads

Technology is going to enrich our lives while at the same time simplifying them, right?

Every Tom, Dick and Harry is talking about multimedia network links, Web servers and 3,000 channels to the home. But at the risk of sounding heretical, consider that on-line does not necessarily mean plugged in.

Case in point: When I was logging out of the comp.dcom.cell-relay Usenet group on the Internet last Friday, the network came back with this friendly poke: "There are still 2,821,248 unread articles in 6,795 groups."

That's like returning a book to the library feeling pretty good about your newfound knowledge, only to have the librarian remind you of how little you actually know.

And now that overwhelming feeling is being compounded by the fact that many of the resources available on the Internet are hot-linked to other sources you never knew about or have time to peruse. Sometimes it feels like the depth of our ignorance is growing faster than nodes are being added to the 'Net.

Obviously, information doesn't always translate neatly into knowledge, but the current hype about the wired world would have you believing otherwise. And there are more than a few risks in that.

Besides being potentially damaging to our feeling of self-worth, our bosses will increasingly expect these network investments to pay strategic dividends.

It will become necessary, for example, for every report and missive to be derived of opinion gathered from experts around the world. (It goes without saying they will have to be delivered on CD-ROM and include full-motion video clips.)

But it goes deeper than that. The very fabric of our country is at stake. Many of the children that will lead this great nation in the next century will get to where they are going by using the Internet to plagiarize the great thinkers of the day, knowing they run little risk of being caught. Their accomplishment? Excelling at finding information rather than comprehending it.

Kidding aside, there will come a day in the not-so-distant future when — all our connections made — we will stop and ask ourselves what we have gained.

It would be far better if we ask that question now while we're still in the formative stages. A larger percentage of all the energy being expended discussing how wonderful all these new information delivery vehicles are should go to discussing their application and how they will benefit mankind.

Besides ensuring that we will gain more from our new tools and securing a brighter future for us all, it could save the cost of having to replumb the infrastructure to meet actual needs. Done right, maybe all of this new technology will ultimately enrich and simplify our lives.

(P.S. While you were reading this, another 16,324 important articles were posted on the Internet.)

JOHN DIX jdix@world.std.com

TELETOONS

FRANK AND TROISE

MACROSCOPE

by James Kobielus

Innovative CCE strategy makes Novell leader of groupware pack

Novell, Inc. is fast becoming the pacesetter in the groupware industry. No other groupware vendor, including Lotus Development Corp., can match Novell's broad market vision, comprehensive architecture, diverse applications, commitment to open standards and influence over third-party developers. And no other vendor has a groupware strategy as user-centric as Novell, which invites users to customize workgroup applications with functional building blocks plucked from the heart of its NetWare network operating system (NOS).

Over the past year, Novell has made all the right moves in the groupware market. First, it acquired WordPerfect Corp. and made it the core of an aggressive new groupware product organization. Then it introduced a comprehensive strategy — the Collaborative Computing Environment (CCE) — for supporting third-party, standards-based, client/server workgroup applications over NetWare. And Novell has recruited scores of independent software vendors (ISV) to develop workgroup-enabled applications for its new PerfectOffice net application suites.

What's special about Novell's CCE is its emphasis on custom groupware environments that interoperate with users' existing applications and hook into essential NetWare services. Novell's approach lets users protect their investments in applications, NOSes and other system software. Groupware, per Novell's vision, builds on and extends users' existing nets.

Novell is the first groupware vendor to base its product strategy on open application suites — its CCE-conformant PerfectOffice family — which includes Novell applications plus a wide assortment of user-selectable, workgroup-enabled third-party products. Users of Novell's high-end PerfectOffice Select suite will receive all applications on one or more CD-ROMs. Novell-supplied data keys will be used to unlock only those applications for which the user has paid.

Novell's PerfectOffice is modular and flexible. Users will be able to choose from a core group of Novell-developed workgroup applications, including GroupWise, which supports electronic mail, scheduling, calendaring, task management and document routing; InForms, which handles forms design, data entry and routing; SoftSolutions, which deals with document indexing, retrieval and management; and Envoy, a new cross-platform, electronic document distribution product. Users also will be able to include in-house or third-party PerfectOffice-enabled applications in their suites. They may even opt to replace a core Novell application with a more suitable PerfectOffice-enabled application.

Within the broader CCE framework, Novell is modularizing and unbundling services provided by its NOSes and network applications to better support customized groupware development. Users still will be able to purchase monolithic groupware products such as GroupWise. Alternately, they can use Novell-provided tools to build custom environments which combine, for example, the NetWare 4.X file system, NetWare Directory Service, Global MHS X.400 gateway, GroupWise message transfer agent, InForms workflow engine and WordPerfect text editor.

With CCE and PerfectOffice, Novell is backing away from the industry's outdated notion of groupware products as self-contained application environments. Novell realizes that noncustomizable groupware environments — no matter how well architected — can never support a user enterprise's total collaboration requirements.

By contrast, Lotus and Microsoft Corp. have focused their groupware efforts on self-contained environments and have all but ignored their commercial application suites — Lotus SmartSuite and Microsoft Office, respectively. Lotus continues to add functionality to Lotus Notes, an impressive mail-enabled, replication-oriented, information-sharing environment that parallels (but does not encompass) a workgroup's existing productivity tools.

Microsoft seems to be trying to beat Lotus at its own game. Microsoft's upcoming Information Exchange product will include an enterprise message transfer agent with support for a message database, enterprise directory service, data replication, external mail gateways and a folder-metaphor user interface. Information Exchange will be accessible from any Messaging Application Programming Interface client, including the upcoming Microsoft Windows 95, the long-awaited upgrade to Windows 3.1.

Open suites — not Notes and its insular ilk — are the future of groupware. Lotus, Microsoft and other groupware vendors should consider transforming their products into suites with open interfaces to support integration of in-house and third-party applications. Workgroup suites should incorporate the full range of application program interfaces and service provider interfaces supported under Novell CCE.

At a bare minimum, suite vendors should follow Novell PerfectOffice's example and let users plug the icon of any application they wish into the master task-switcher toolbar. Currently, suites such as Lotus SmartSuite and Microsoft Office allow no icon shelf space for external applications.

Novell's control over market leader NOS is its trump card in the groupware market. Before long, most groupware vendors will have to integrate their products into the CCE environment. The undesirable alternatives would be to forego such fundamental NOS services as message transport, file sharing, directories and remote communications, or duplicate these capabilities — at great trouble and expense — with redundant application modules.

Novell is transforming the groupware industry with its radical emphasis on infusing NOS services — through open industry-standard interfaces — into every aspect of workgroup application development. Through its vision and influence, Novell is making it easier for users to build groupware capabilities into any and all network applications.

Kobielus, a contributor editor to *Network World*, is a senior telecommunications analyst with DynCorp Information and Engineering Technology, Inc., a Fairfax, Va.-based systems integration and professional services firm. He can be reached at (703) 461-2367 or via the Internet at kobielj@usva8.dyncorp.com. The opinions expressed are his own.

INFORMATION SUPERHIGHWAY

by Bud Huber

NII Awards honor innovative infobahn users

It's ironic that users of the information superhighway (or infobahn) are, in general, its least-heard-from constituency. Most of the information superhighway hype has come from those industry sectors that stand to gain by providing either the products and services that will become the on- and off-ramps to the infobahn or the applications that ride on top of it. However, it is the users who will ultimately determine whether this global undertaking and its associated massive resource expenditures will succeed.

Unfortunately, many users have a "So what?" attitude toward the infobahn. The common perception among users and prospective users — especially among executives who make acquisition and expenditure decisions — is that the infobahn is being built to give us 500 channels of *Gilligan's Island* reruns and that the Internet is just some arcane academic and military tool, or a toy through which kids play games.

Those who are closest to implementing leading-edge networking applications know that it's much, much more. The infobahn is the common utility we will use to make business more competitive and create a society that is healthier, better educated and more prosperous.

One significant question before us is how to educate large numbers of the public about the infobahn's potential and how to use it to their advantage.

Fortunately, there is a National Information Infrastructure (NII) Awards program that provides such an answer.

The NII Awards is a public recognition program sponsored by every major network supplier and a cross section of the nation's most prestigious private- and public-sector organizations.

It is the brainchild of some visionary thinkers from a Santa Monica, Calif.-based company called Access Media, Inc.

The NII Awards program is designed to publicly identify and acknowledge organizations, businesses and communities, or communities-of-interest, that are already achieving concrete gains through the use of the NII. By highlighting compelling, real-world uses of the infobahn, the NII Awards will satisfy the users who had questioned the infobahn's value and inspire even more creative uses and applications. Of course, the more people plug into and use the infobahn, the more valuable it will be to all of us.

I encourage any company or organization that is already using advanced networking in solving real-world problems to become a candidate for the first-ever NII Awards. It is an opportunity to gain some well-deserved public recognition while dispelling some of the hype about the infobahn. Nominations are open to all, without cost. Nomination information is available via the Internet at info@niiawards.org or by calling (313) 453-9137. All nominations must be received by Feb. 17.

➪ Huber is manager of strategic planning for GM Hughes Electronics in Los Angeles and is active on the Enterprise Network Roundtable and the ATM Forum. He can be reached at (310) 364-6582 or via CompuServe at 72130,1217.

A clearer picture

Your article "The Tale of the Beast" (Dec. 26, 1994/Jan. 2, 1995, page 4) contained incorrect information about the financial performance of PictureTel Corp. and another company in the videoconferencing industry that painted PictureTel in a much less advantageous position than it deserves.

The article compared the actual 1993 and projected 1994 earnings of PictureTel and Compression Labs, Inc. (CLI). Unfortunately, it stated that CLI's 1993 revenue was $40 million, when in fact the company reported revenue of approximately $140 million.

Thus, if CLI reports revenue of $169 million in 1994 as you stated they will, then their year-over-year revenue will grow by 20%, not the 323% you reported.

The error indicating that CLI is rapidly increasing its revenue is compounded by your statement that CLI's estimated 1994 revenue of $169 million will see it "catching up quickly to PictureTel, whose sales climbed 20% to $196 million." However, the consensus of Wall Street analysts who follow the videoconferencing industry indicates that PictureTel, which reported $181 million in revenue through the first three quarters of 1994, is expected to have revenue of about $250 million when year-end figures are published in February. If that estimate is correct, then PictureTel will continue to be the clear revenue leader among videoconferencing companies with more than 40% year-over-year growth.

Another article on PictureTel in the same issue (page 29) left readers with the mistaken impression that we are contemplating dropping out of the desktop videoconferencing business.

Like any good business, PictureTel constantly evaluates the investments we make and the markets we pursue. However, we could not be more pleased with the performance of our desktop videoconferencing division and anticipate that it will become profitable by the end of this year.

Unfortunately, that information was not included in the article.

Norman Gaut
President and CEO
PictureTel Corp.
Danvers, Mass.

Editor's response: Our apologies on two counts. Our records show we failed to take into account a projected $35 million in revenue for PictureTel's Personal Business desktop products, bringing the company's total revenue, as forecast by our Wall Street sources, to $231 million in 1994.

That error was compounded by the fact that there was a mistake in the financial data CLI supplied in the Network World 200 survey. CLI's revenue in 1993 was $141 million, not $40 million as the company indicated on the NW 200 form. That knocks CLI off the chart listing the 15 companies that grew the fastest from 1993 to 1994.

And it also shows CLI growing at a slower clip than PictureTel: CLI is projected to grow 20% from 1993 to 1994 vs. estimates of 41% growth for Pic-tureTel.

Feeling left out

Your "Power Players" issue is a significant effort encompassing key issues, products, companies and personalities in the networking industry. However, we are mystified as to how Xircom, Inc. could have been overlooked in the preparation of such an attempt at creating an exhaustive listing.

As a publicly traded networking company, we most certainly make the cut in terms of revenue, which would have placed us around companies such as Banyan Systems, Inc., Attachmate Corp., Chipcom Corp. and Gandalf Systems Corp. We've won numerous industry networking awards and have been listed by *Forbes* and *Fortune* as one of the fastest growing small public companies in the U.S.

Furthermore, our president, Dirk Gates, has been heralded in numerous profiles as one of the strongest young leaders in American business, high tech and networking today.

We have no record of having been approached by editorial or advertising people about this issue, either by phone or mail. Also, as far as we know, there was no prior editorial calendar listing of this as an upcoming issue to work toward.

As you may know, Xircom focuses on the development and manufacturing of mobile networking products, including wired and wireless client and server hardware and software.

We believe we are a significant leader in the networking industry and perhaps the foremost specialist in mobile networking, which is a burgeoning segment of the networking market.

Serge Timacheff
Director, public relations
Xircom
Thousand Oaks, Calif.

What about us?

After combing through your "Power Players" issue, I was disappointed by your omission of ACC Systems, Inc. from your featured article "The Tale of the Beast" and especially from the list of network-related equipment and services providers.

In 1991, ACC Systems spun off Advanced Computer Communications (listed in your article) and remains a major distributor and value-added reseller for that company's line of bridges and routers. Our most recent project in this area is a multilevel secure router. The technology is portable across various vendors' platforms and is currently

See In-box, *page 44*

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For more details on how to reach us, see page 58.

OOPS, MAYBE WE GAVE IT TOO MUCH POWER.

intel inside
pentium PROCESSOR

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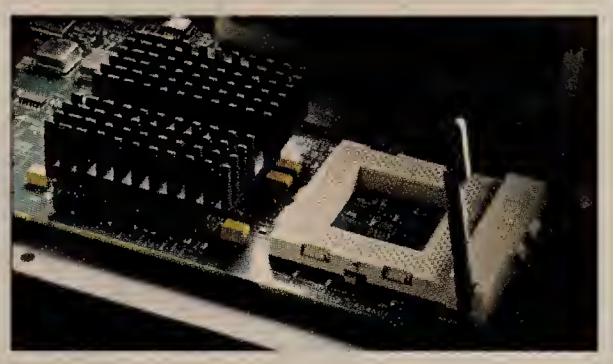

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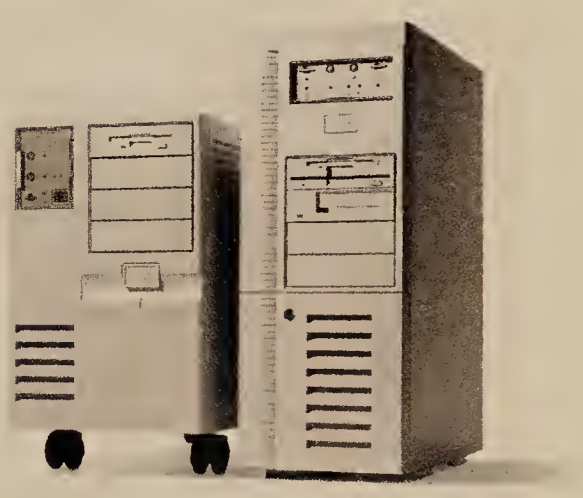

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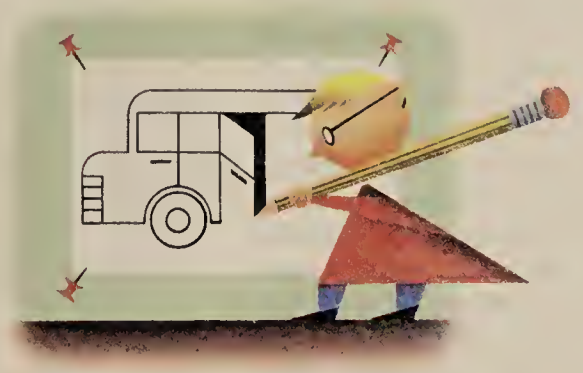


Server searching:

a game of break the bottleneck

By Tony Croes and Josh Penrod

Server seekers take heart. Limiting your search for network servers to only those that offer unique tricks to overcome common performance bottlenecks will ease your selection process.

Hunting for bottleneck breaking products obviates the need to evaluate every technical advance that has come down the pike in the last 18 months, and there have been quite a few of them. Fierce competition forced vendors to make the personal computer-based technologies originally developed for high-end servers available on lower end models and to introduce sophisticated software integration and management tools.

For instance, such features as systems management software, automatic server

Continued on page 34

To get the server with the right moxie, you have to avoid the temptation to review all the technical advances.

INSIDE

Continued from page 33

recovery, remote maintenance and predictive diagnostics that were the mainstay of high-end products are now the norm for mainstream servers and even have appeared on entry-level units. These PC-based servers use Complex Instruction Set Computing (CISC) or Reduced Instruction Set Computing (RISC) chips and support industry-standard PC I/O buses, such as Extended Industry Standard Architecture (EISA), Micro Channel Architecture and Peripheral Component Interconnect (PCI).

Additionally, some large systems and vertical market vendors, such as Auspex Systems, Inc., Digital Equipment Corp., NEC Technologies, Inc. and Tatung Science & Technology, Inc., have entered the PC-based server market with products that use RISC or scalable processor architecture (SPARC) chips.

With so many advances being foisted upon you, the initial temptation is to plow through them all. But the selection process can be simplified by looking for products that improve on standard and well-understood PC technology to overcome the specific bottlenecks applications encounter.

Determining how an application stresses a server will let you focus on the type of bottlenecks — CPU, bus I/O, disk I/O or network I/O that are inherent in products using traditional PC designs — the server must smash.

Even with all the technical advances, there are enough competitors with innovative offerings that service and support has become a key factor in making one vendor stand out from the others. In fact, the three leaders in the server market — Compaq Computer Corp., IBM and Hewlett-Packard Co. — didn't get to the top by technology alone. These companies stand behind their products with very strong consulting, service and support programs.

SERVERS GALORE

At times, it seems vendors of every type of computing system have attached the server label to their products. Mainframe and minicomputer vendors tout how their machines can act as network servers. Vendors of proprietary and expensive superservers claim their boxes offer mainframe-like performance and features for less cost.

Mainframes, minicomputers and other units supporting massively parallel processing fall into what is essentially a market of their own, with selection criteria that is vastly different from PC-based servers. These very high-end servers support a limited and often proprietary set of operating systems and uniquely designed processors, and carry price tags in excess of $500,000.

For many users, PC-based servers that run general-purpose operating systems such as Unix, Windows NT and OS/2 are the ticket.

High-end PC-based servers have a number of fault-tolerant features, tremendous expandability and support for symmetric multiprocessing (SMP), features formerly found only on superserver class machines. These servers also have bus architectures designed to maximize concurrency, sophisticated cache designs and numerous fault-tolerant features designed to provide maximum server availability.

Prevalent high-end features include error checking and correcting (ECC) memory, which maintains the integrity of data in random-access memory and stored on disk; components that can be swapped without bringing down the server; intelligent drive controllers; and redundant subsystems. High-end servers range from $11,000 to more than $100,000.

Mid-range servers offer high availability, manageability and performance at a more moderate price of between $4,000 and $16,000. These servers typically have large storage and memory capacities, as well as segmented bus architectures. Support for multiprocessing, ECC memory and other fault-tolerant features often cost more.

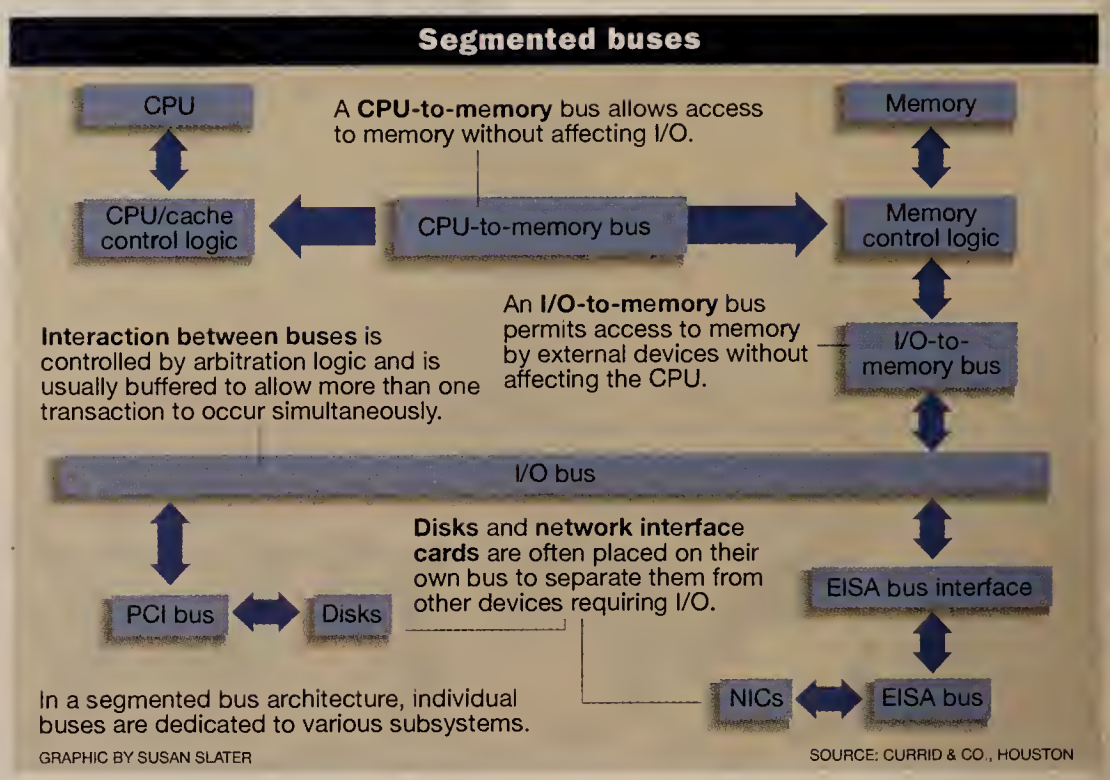
At the low end, a new line of entry-level systems engineered specifically as servers are replacing high-end desktop systems that could masquerade as servers. Suited to fit the needs of branch offices or departments, these units include software integration tools, server management software and predictive diagnostics on top of basic PC server technology. Prices range from $2,000 to $4,000.

Products in each market segment are being outfitted with technology to overcome the four common bottlenecks.

Bottleneck One: CPU

The first bottleneck affects CPU performance. Increasing the speed or number of CPUs improves performance but provides only a partial solution. The fastest CPU in the world essentially will twiddle its thumbs if it's starved for computing instructions and data. This is why high-performance servers use special cache designs, bus designs, memory management and other architectural features to keep the CPU primed with instructions and data.

The architectural enhancements apply equally to servers that run in asymmetric multiprocessing (ASMP) mode, which dedicates individual CPUs to independent tasks; SMP mode, which enables multiple CPUs to share processing tasks and memory; and clustering mode, which enables CPUs on multiple servers to work in ASMP mode.



There are also arguments about whether CISC or RISC chips perform better, but that debate is abating (see story, this page). Both types of chips see performance gains as the number of transistors that can be placed on them.

As CPU chips become more dense with transistors, the performance gains typically outpace the ability of main memory subsystems to keep pace. To prevent the CPU from accessing main memory too often, engineers place high-speed cache memory between the CPU and main memory.

Cache memory is much faster than main memory. With cache memory, a controller keeps computing instructions and data the CPU likely will need in a location that is more quickly accessible than main memory. Most CPUs have some form of cache memory built-in — called a Level 1 cache. The additional cache memories that engineers place outside the CPU are known as Level 2 and Level 3.

Even at the low end of the server market, you may see several cache designs employed to maximize server performance in CPU-intensive tasks. Here are explanations of some of the cache designs you may encounter:

■ Write-through cache stores copies of instructions or data found in main memory for quicker access. The CPU reads the cache memory rather than main memory. When an instruction or piece of data stored in cache has gone unread for a specified amount of time, it is overwritten with a more frequently used instruction or piece of data.

■ Write-back cache enables the CPU to both read and write instructions and data to cache memory. Instead of forcing the processor to wait while an instruction or data is written back to main memory as in a write-through cache, the CPU writes to the cache and is then free to perform other tasks. The cache controller takes care of writing these locations back to slower main memory. Compaq's TriFlex/PCI architecture uses write-back cache to gain a 5% performance improvement over write-through cache.

■ Direct-mapped cache stores data from memory in a one-to-one relationship. That is, a single location in memory can be copied into only a single location in the cache. If instructions or data in cache remain unused for a specified time, they are overwritten.

■ Two-way set associative cache improves

CISC vs. RISC becoming a nondebate

As Complex Instruction Set Computing (CISC) and Reduced Instruction Set Computing (RISC) chip technologies converge, users no longer have to hang on every word in the debate that rages over which is better.

In fact, there's some question whether users ever paid as much attention to the debate as vendors thought. While RISC vendors continued touting their chips' ever increasing clock speeds and growing support for more personal computer operating systems, users continued gobbling up CISC chips.

That trend is expected to continue, with predictions that users this year will buy five million CISC-based systems to keep that chip in the market-leading position, according to a recent Dataquest, Inc. study.

Users may continue to embrace CISC chips because advances in technology have weakened the arguments in favor of RISC. For instance, the idea that CISC is an aging technology that has reached the end of its useful life is not totally true. While early CISC architectures such as Intel Corp.'s 8086, 80286 and 80386 cannot compete with high-performance RISC chips, newer CISC architectures such as Intel's existing 80486 and Pentium, as well as its future architectures compete neck and neck with RISC chips.

The term RISC really no longer has any meaning. Today's RISC architectures have taken on CISC characteristics. The PowerPC chip developed by IBM, Apple Computer, Inc. and Motorola, Inc. isn't the small, fast, Spartan chip normally associated with RISC. The PowerPC 601 chip has 2.8 million transistors, only 10% fewer than Pentium, and has more than 200 instructions. The traditional definition of RISC limits the number of instructions to 128 or fewer.

Meanwhile, the Pentium chip broke the CISC mold by employing a RISC feature called superscalar architecture that enables it to execute more than one instruction per clock cycle. Future generations are moving to a more RISC-like core. There are even rumors in the mill about a combined RISC/CISC architecture being codeveloped by Hewlett-Packard Co. and Intel for the future-generation P7 processor.

The argument that RISC technology is less expensive than CISC also doesn't hold much water. This argument only has merit if you consider the CPU itself. Once total system cost is accounted for, the price advantage RISC has over CISC disappears. The reason is that the CPU represents only about 1% of delivered system cost. The remaining 99% is made up of memory, drives, other system components, the operating system and applications.

Overall, it seems that CISC and RISC chip technologies are becoming more alike. When running software designed for their respective environments, CISC performs competitively with RISC. However, when PC software is run on RISC chips, RISC cannot compete with CISC. In terms of cost, RISC is no less expensive than CISC when total system cost is considered.

upon direct-mapped cache by putting instructions or data from main memory into one of two cache locations. This technique decreases the chances that a newly cached location will replace a cache location the processor has read recently and increases the chances that a recently read cache location will still be there if the processor needs it again. Compaq's TriFlex/PCI architecture uses this cache to get a 5% performance improvement over direct-mapped cache.

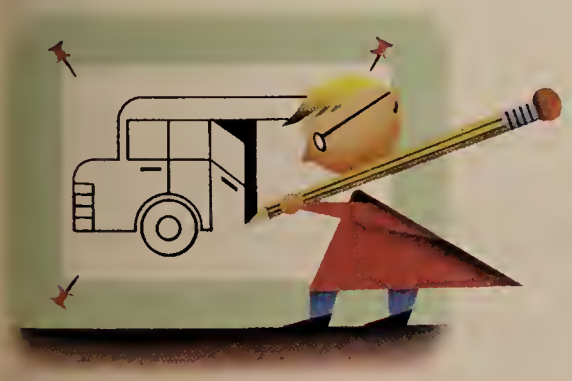
Tricord Systems, Inc. and AT&T Global Information Solutions (GIS) add more logic to implement a bus-snooping protocol into their cache designs. Snooping enables a CPU to access data stored in the cache of another processor when a check of its own cache fails to turn up needed data. An additional technique, called cache snarfing, lets a memory read operation update multiple external caches. This technique — also known as a simultaneous fill — can result in performance improvements of as much as 15%. HP is touting the benefits of these techniques.

Yet another technique, called pipelining, prevents the CPU from waiting unnecessarily while data is being fetched from memory. The process of fetching data from memory requires a cycle of time on the CPU-to-memory bus. In a nonpipelined architecture, a second cycle is not started until the first one completes, and there is a time delay before the second cycle starts. In a pipelined bus architecture, the second cycle begins before the first cycle completes. This way, the data from the second cycle is available immediately after the completion of the first cycle. Pipelining is found on Digital's RISC-based servers as well as Compaq's and Tricord's products.

Look for vendors to engineer more sophisticated and larger caches that will minimize how often main memory is accessed. The more sophisticated write-back and set associative technologies are most common in the higher level servers, but they should quickly move down to the mid-range and entry-level servers as vendors try to differentiate their products.

When an application is CPU-intensive, there is no substitute for the software vendor's experience. Lotus Development Corp.'s Notes is an example of a notoriously CPU-intensive application. Notes is characterized by periods of relative inactivity followed by periods of high CPU usage. In improperly configured servers, usage spikes can even be caused by user actions such as reindexing a Notes database so it can be viewed differently. Vendor expertise in scheduling indexing and replication, for example, can make a significant performance difference.

Bottleneck Two: Bus I/O and Concurrency



Cache systems are designed to keep the CPU supplied with instructions and data by managing access to main memory. However, bus mastering I/O devices also contend for access to main memory, and they run at a much slower rate than the CPU. Therefore, CPU-to-memory operations should take precedence over I/O-to-memory operations, but not at the expense of interrupting these I/O operations. This is why most high-performance servers are engineered to let the CPU and I/O devices simultaneously access main memory in what is known as maximizing concurrency, or minimizing contention.

Maximizing concurrency is facilitated by placing buffers between high-speed system buses such as the processor/cache-to-memory bus, the processor/cache-to-I/O bus and the I/O-to-memory bus.

These buffers capture data reads and writes between buses to prevent one device, such as a CPU or I/O card, from waiting for another to finish. For example, buffers between the processor/cache bus and the I/O bus capture CPU writes to I/O bus devices.

Once the CPU writes to these buffers, it is then free to continue processing tasks while the data is written from the buffers to the intended device. The same process can happen between any of the system buses, letting them operate independently.

Vendors use these buffers in segmented bus architectures that can segregate different devices on various buses (see graphic, page 34). For example, HP and Compaq place Small Computer System Interface (SCSI) devices on an EISA bus, while others, including Zenith Data Systems Corp. and Tricord, assume there are performance gains in placing SCSI devices directly on a PCI or proprietary system bus.

Tricord requires transfers intended for either memory or I/O devices to cross its proprietary PowerBus instead of using separate paths between the CPU and memory. Interestingly, Zenith chose to implement dual data paths of 256M byte/sec each between CPUs as well as between the memory and I/O buses. Compaq, on the other hand, chose a single 533M byte/sec bus between CPU and memory in its TriFlex/PCI architecture.

Server vendors will continue to enhance these segmented bus architectures — also known as split bus architectures — and improve the buffering designs in order to maximize concurrency. Intel's Multiprocessing Specification (MP) 1.1 will not hinder efforts in this area as some might claim. Rather, MP 1.1 will provide a common frame of reference for operating system vendors while still allowing server vendors to differentiate their products. Additionally, look for server vendors to leverage high-end designs and use these technologies in the newer classes of entry-level servers. Quite a few vendors, including AST Computer, Inc., Compaq, HP and Tricord, are doing it already.

Not checking

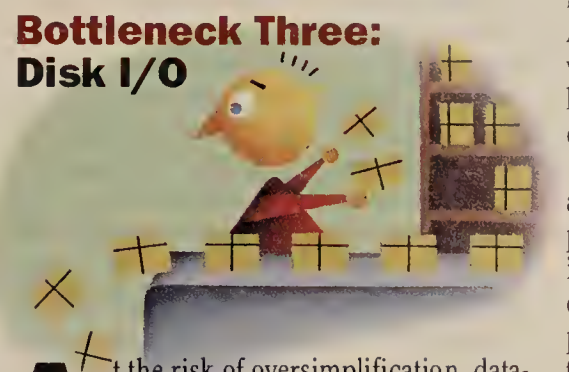
Of the 21 vendors surveyed, those that do not support parity checking within their memory are:

- Apple
- Tatung Science & Technology
- Tricord

Those vendors not supporting parity checking within their buses include:

- AT&T
- Advanced Logic Research
- Apple
- AST Computer
- Cubix
- Integrix
- Large Storage Configurations
- Polywell
- Tatung Science & Technology
- Tricord

Bottleneck Three: Disk I/O



At the risk of oversimplification, database management systems are traditionally bound by the performance of the processor and disk subsystem. Once the CPU-to-memory system and I/O bus are operating at peak performance, the bottleneck shifts a little further along the food chain — usually to a disk or network port.

Disk I/O bottlenecks are encountered by such applications as high-volume transaction processing that moves many small transactions between the CPU and disks, and decision-support databases that move many records between the CPU and disks. In these cases, performance is affected by disk speed, the number of disk drives, and the intelligence and speed of drive array controllers.

As with processors, an obvious way to improve drive performance is to use faster drives. In general, with each increase in drive capacity comes a corresponding increase in drive performance. In systems with a single disk, this logic is valid.

However, the number of disk drives in the system has a greater effect on server performance than the speed of individual drives. This is because of reduced latency in the positioning of drive heads and the fact that more than one set of read/write heads may be active at a given time. The greater the number of drives, the greater the performance of the drive array.

For this reason, you will find that some vendors recommend using several 330M-byte or 550M-byte drives over a single 1G-byte or 2G-byte drive, even when the speed of the individual 1G-byte or 2G-byte drive is marginally faster than the smaller capacity drives. The results of empirical testing by Compaq's Systems Division back up this contention (see graphic).

Almost without exception, Fast SCSI-2 is the bus of choice for server disk subsystems. Mid-range or low-end servers typically have an integrated Fast SCSI-2 controller on either EISA or a local bus, with intelligent array controllers as an option. Fast SCSI-2 has twice the speed of SCSI, moving data from disk to server at 20M byte/sec.

Similarly, Fast Wide SCSI-2 expands the speed to 40M byte/sec.

Some mid-range and low-end models include array controllers as a standard feature. At the high end, most configurations come with an intelligent array controller. At this level, the same logic applies — more drives equals better performance.

However, even with multiple drives, there are a number of other ways to improve disk I/O performance. Multichannel bus mastering intelligent drive array controllers — some vendors call them I/O processors — have onboard processors and memory that allow both CPU-to-memory and disk-to-memory transactions to occur simultaneously when used in a bus promoting high levels of concurrency.

These controllers typically support more than one disk channel per bus interface and implement support for multiple Redundant Array of Inexpensive Disks (RAID) levels in hardware. Implementing RAID in hardware instead of software removes the burden of parity and striping calculations from the host CPU and allows the controller to manage the distribution of data writes evenly across the array of drives. Several vendors offer hardware-based RAID (see graphic, page 36).

There is room for differentiation among disk array controllers from different vendors. Tricord, for example, contends its use of I/O processors attached directly to the system bus instead of an I/O bus improves performance as more drives are added.

Vendors also will attempt to differentiate themselves with functional multiprocessing, in which certain processors are dedicated to serving specific tasks such as disk I/O. Don't be fooled, though. Almost all of the intelligent array controllers have high-performance processors on them, as well.

Some of these high-end intelligent array controllers also support posted or write-back cache systems, which permit the CPU to continue processing immediately after a write operation. This leaves the controller to take care of the actual write to disk. Compaq's Smart SCSI Array controller supports not only the posted write-back cache, but also a mirrored, battery backed-up cache designed to ensure reliable writes to disk in the event of a memory error or a complete power failure. When power is restored, data written into nonvolatile memory is written to disk.

Once again, competition is going to force the high-level technologies in this area into low-end servers. Multichannel, intelligent, Fast SCSI-2 array controllers will become the

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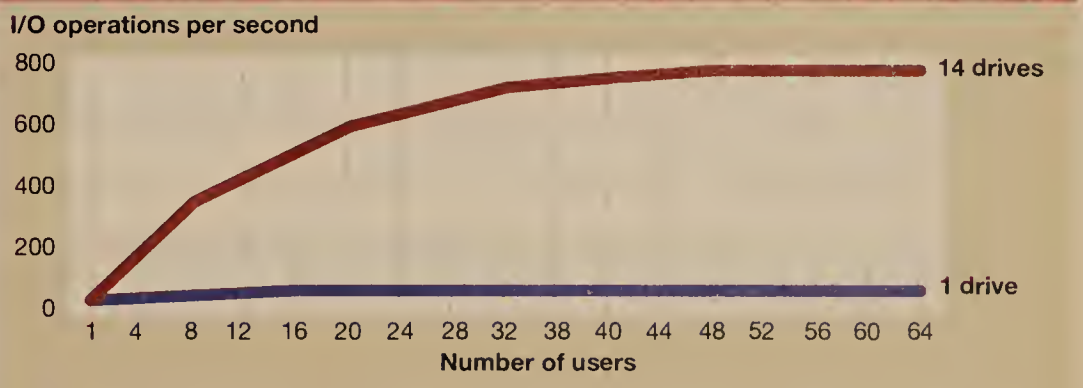
More, not faster, disks



Using more of the same drives instead of a faster drive can improve overall performance as the number of users increases, as shown in this performance test of HP C-2247 1G-byte drives.

SOURCE: COMPAQ SYSTEMS DIVISION, HOUSTON

Continued from page 35

norm for all servers. However, look for fault-tolerant features such as battery backups and posted write-back cache to remain differentiating features.

Bottleneck Four: Network I/O

When data from the CPU is destined for a network port instead of a disk, it can cause a slightly different bottleneck and limit the number of users that can simultaneously make server requests.

In applications where the net is the primary bottleneck — such as file and print services, video servers and imaging systems — the trend is to use very high-performance, low-utilization network interface cards (NIC) while architecting the overall net to maximize server performance. Aside from changes to the network, the performance of a server-to-LAN channel is affected by NIC driver optimization, the bus mastering capabilities of the controller, concurrent access to server memory and the number of LAN channels per bus interface.

Good examples of optimized NICs with more than one channel per bus interface are Compaq's dual-headed NetFlex-2 Ethernet controller, based on Texas Instruments, Inc.'s Super Eagle and Packet Blaster chipsets, and Polywell Computer, Inc.'s NetArray PCI-based four-channel Ethernet controller.

However, in environments where CPU utilization is an issue, there is a point where placing additional NICs in the server yields diminishing returns due to the overhead associated with routing and servicing the NIC. As a rule of thumb, this threshold occurs when more than three NICs are placed in a single server.

As with disk I/O, server vendors will continue to enhance the multichannel bus mastering controllers and make this technology prevalent throughout their various server lines. Look for the vendors to increase the use of high-speed technologies such as Asynchronous Transfer Mode and 100M bit/sec Ethernet in conjunction with switching, and the concept of placing servers on dedicated high-speed LANs that will keep the server and end users from waiting on the network.

FAULT TOLERANCE

Aside from blasting bottlenecks, servers must have strong fault-tolerant features, as well as good management software and utilities. And in a mad scramble for your server dollar, vendors have brought these elements from superservers to entry-level products to remain competitive.

However, don't take fault-tolerant and management features for granted, because they are not all alike. Take ECC memory, for example. Most vendors support ECC for single bit memory errors — the most common type. When there are memory errors that exceed a single bit, these servers generate a nonmaskable interrupt and halt processing.

Vendors such as Compaq use advanced ECC memory to detect and correct errors to as many as four adjacent bits. This means that an entire chip could fail and the Compaq server would continue to run.

In addition to ECC, there are a number of fault-tolerant features to look for, including automatic server restart after a system failure, automatic drive monitoring and drive repair, parity checks across internal data paths, hot spares and redundancy, as well as load balancing and redundancy capabilities across NICs.

Having the hardware is only part of the solution. Overall server manageability and availability depends on hardware, operating system support and effective management software. The last of these is critically important. Networks fail because of improper management far more often than they do because of component or subsystem failure.

A comprehensive management strategy that encompasses problem prevention, detection and recovery is as important as any feature implemented in hardware. This is why many vendors now develop and bundle management software with their high-end and mid-range servers free of charge. AST Computer's Percepta, Compaq's Insight Manager, IBM's NetFinity and HP's NetServer Assistant are prime examples. In some cases, the management hardware is implemented on a more expensive add-in card rather than built into the server, as is the case with HP's Remote Assistant and IBM's ServerGuard.

STANDING BEHIND THE PRODUCT

When buying such a sophisticated piece of hardware, the decision can't be made on pure technology. Vendor service and support track records should be weighed almost as heavily as product technical merits.

This is not to say that you should alter your purchase decision away from a server you're enamored with because the service programs and warranties are not up to snuff. It simply means that the quest for your server dollar is so competitive that you can, and should, expect excellent service and support.

Perhaps the most important part of service is the warranty. The best warranties provide three years of on-site support and covers parts and labor. AT&T GIS, Acer America Corp., AST Computer, Compaq, Dell Computer Corp., Digital, HP, IBM, Polywell, Tricord and Zenith all offer three-year warranties.

Another important part of service is a vendor's response time to a problem call. The best guaranteed response time is Polywell's promise of responding in eight hours. Zenith guarantees a slightly more nebulous time of one day, while Digital, HP and IBM claim to provide next-day service. Compaq and Tricord commit to respond within two days.

NETWORK WORLD SHORT LIST 1995

Servers

The Short List highlights products Network World *recommends you examine during the purchasing process for servers. This Short List directs your attention to a few models in each market segment, making them appropriate for deployment in various locations across the enterprise. Products named in the high end fill the role of powerful applications servers, while low-end and mid-range products were named for using technologies commonly found in higher end servers.*

High-end

This class of product really shines as a dedicated application server because of powerful multiprocessing capabilities as well as strong fault-tolerant and management features. **Tricord Systems, Inc.'s ES5000** is a solid application server with good service and support. But, at $77,750, the ES5000 is a tad expensive. For around $18,000 or less, you can own the best in this arena: **Zenith Data System Corp.'s Z-Server GT, Compaq Computer Corp's Compaq ProLiant 4000** and **Acer America Corp.'s AcerAltos 17000.**

Compaq's offering has hot-pluggable hard drives, management software, a tool for optimized operating system installation, advanced error checking and correcting memory, and a three-year warranty. Zenith's Z-Server GT has a unique CPU-to-memory bus that employs dual data paths that are not tied to CPU clock speed, a feature that makes CPU upgrades independent of the bus architecture. Acer America offers competitive features and a warranty for ess than $10,000. However, both Zenith and Acer America lack management software.

Mid-range

This server class is typically a corporation's general-purpose workhorse, filling the role of multipurpose file and print server or dedicated application server. The ones to look at are **Compaq's ProLiant 2000, Zenith's Z-Server EX, Hewlett-Packard Co.'s HP NetServer LM, Advanced Logic Research, Inc.'s (ALR) Revolution Q-4SMP, IBM's IBM PC Server 500** and **AST Computer, Inc.'s Manhattan P5090.** With the exception of IBM's IBM PC Server 500, each of these products is multiprocessor-capable. ALR's Q-4SMP can be upgraded to hold four processors but only has a 12-month warranty. The IBM PC Server 500 is a solid machine with excellent service and support, despite its lack of multiprocessing and sole reliance on Micro Channel Architecture bus expansion boards. The AST Computer, Zenith, HP and Compaq offerings support two processors, 1G byte of storage, Redundant Array of Inexpensive Disks (RAID) Levels 0, 1 and 5 and a three-year warranty. Compaq offers 32M bytes of random-access memory, while the other vendors offer 16M bytes of RAM.

Low-end

This class of server was designed for budget-strapped users. **Compaq's ProSignia VS** and **HP's HP NetServer LC** are outstanding performers in this class. Both products leverage technologies typical of higher end servers, such as split bus architectures and processor cache. Both also have excellent service and support. The NetServer LC only comes with a 16K-byte processor cache compared to the 256K-byte processor cache on the ProSignia VS and has no disk cache, while the ProSignia VS has a 4M-byte disk cache. But the NetServer LC has a base price of around $2,420 compared to a base price of $3,352 for the ProSignia VS.

Hardware-based disk mirroring

Company	Product	Max. no. of disk pairs
Acer America	AcerAltos 7000/p	6
	AcerAltos 17000	8
Apple	Workgroup Server 6150	3
	Workgroup Server 8150	4
	Workgroup Server 9150	7
AST	Manhattan P5090	2
	Manhattan V5090	2
AT&T GIS	Globalyst Server 3404	6
	Globalyst Server 3416 XL	7
Auspex	NS 7000 Series 200 Network Data Server	17
	NS 7000 Series 500 Network Data Server	30
Compaq	Compaq ProLiant 4000, Compaq Proliant 4000R	35
	Compaq ProSignia 500	28
	Compaq ProSignia VS	21
	Compaq ProSignia	28
	Compaq ProLiant 2000 and ProLiant 2000R	35
Cubix	Multiserv/FT	7
DG	AV 8500 Plus	125
	AV 9500 Plus	250
Dell	PowerEdge SP 5902	28
HP	HP NetServer LC	35
	HP NetServer LF	35
	HP NetServer LM	35
IBM	IBM Server 95/Server 95 Array	3
	IBM PC Server 500	18
Integrix	SWS 5/85 Sparc Workstation	1
Large Storage Configurations	Integrated Data Server 1000	128
NEC	RISCserver 2200	64
Plexcom	Quantum Net Q6000	7
Tricord	ES5000	84
	ES4000	84
	ES3000	32
	DS1500	7
	DS1000	7
Zenith	Z-Server EX	4

One or two days is a long time when a mission-critical application is unavailable due to server problems. To combat this, many vendors, such as AST Computer, Compaq, IBM and Tricord, offer a more expensive, premium service with guaranteed response time of four hours or less.

Even this four-hour response time doesn't seem enough. Four hours is half a working day. Add the time necessary to troubleshoot and actually correct the problem, and before you know it, a whole day has been lost.

Of almost equal importance to the warranty is the availability of replacement parts. You would hope the vendor has what you need in stock and can get it to you quickly. But you've also got to look at how quickly the vendor can replace out-of-stock parts.

Polywell's wait of 72 hours is one of the shortest for out-of-stock parts. Tricord promises five days, while Dell promises seven to 10 days. HP and IBM tell users to wait two weeks, while Zenith makes them wait as many as three weeks and Digital up to 30 days.

The care and feeding of network servers is as complex as evaluating their technical abilities. This is why access to vendor-provided product information and technical support is so important.

Like most vendors, AST Computer, Compaq, HP, IBM and Zenith provide toll-free numbers that let users get quick answers and help by speaking to trained technicians. Zenith, Compaq, Digital and HP provide fax-back services that let customers request technical information on a push-button phone and get it on their fax machines. AST Computer, Compaq, Dell, HP and Tricord also have at least one forum on major on-line services such as America Online, CompuServe, the Internet and Prodigy as well as their own electronic bulletin boards.

White papers that spell out a company's technology direction, product specification sheets and technical configuration guides can all be extremely useful. Vendors producing these technical publications provide customers with valuable resources to solve problems, answer questions and plan for future purchases without having to hold the phone for the next available representative.

AST Computer, Compaq and HP even provide published information on CD-ROM. HP's Support Assistant, which is updated quarterly, contains technical updates, system-level documentation and accessory information. Compaq's QuickFind is a CD-ROM database of server product and other information that also is updated quarterly. AST Computer goes a step further with Informa, a multivendor reference and library of how-to-do-it hints.

Compaq, HP and IBM offer in-house integration and consulting services that complement services offered by their trained value-added resellers and integrators. These help users deal with the site preparation, cabling, application, integration and net optimization issues encountered in rolling out services into their enterprise nets.

For users that would rather do it themselves, Compaq, HP, IBM and Tricord all have training programs. Also, Compaq, HP, IBM and Zenith have priority phone support for their resellers that have received similar training and need answers to questions quickly.

Simply working well with resellers and customers is not enough. A vendor needs to have continuing working relationships and strategic alliances with major component suppliers and software developers. Such alliances provide the best quality product that has room to grow with technology. For example, engineering microprocessor upgradability into current servers requires close ties to microprocessor manufacturers.

Working closely with software vendors can produce server configurations highly tuned to the operating system. Tricord provides configuration guides for tuning their servers to The Santa Cruz Operation, Inc.'s (SCO) OpenServer and Lotus' Notes. Similarly, Zenith provides integration documents for SCO, Microsoft Corp.'s Windows NT and Novell, Inc.'s NetWare.

Compaq and IBM go a step further. Compaq's CD-ROM-based SmartStart software asks some interactive questions to users installing a server and then configures the server to run optimally in NetWare, Windows NT, SCO or OS/2 environments. Recently, this program was expanded to include tuning and configuration support for enterprise client/server databases, including Oracle Corp.'s Oracle7.1 and Microsoft's SQL Server running on Compaq's ProLiant 4000.

IBM provides a competing product called ServerGuide that contains encrypted net operating system software utilities, tuning and performance tools, and on-line documentation.

IN THE END

Users also need to consider future advancements in deciding whether to buy now or wait. Fierce competition among Intel, AMD Co., Cyrix Corp. and NextGen in the Pentium-class processor market will drive chip prices through the floor. At the same time, server vendors will try to achieve better cost and performance with multiple Pentium-class microprocessors than what the next-generation chips will deliver. The long and the short is that the market may not be so quick to move to newer processors, such as Intel's P6.

Over the next couple of quarters, multiprocessing boxes will become more mainstream as multiprocessing versions of Novell's NetWare and UnixWare, Microsoft's Windows NT, SunSoft, Inc.'s Solaris and IBM's OS/2 become available.

Finally, while compliance with Intel's MP 1.1 specification grows, look for vendors to keep fighting it out with new features. Intel's MP 1.1 gives vendors some room for innovation in server designs. Still, the specification does offer benefits in terms of the widespread availability of shrink-wrapped MP software.

When it's all said and done, server selection is a game of chasing down the bottlenecks your applications will encounter and successively eliminating them. Then you have to make sure the vendor you select stands behind the product with service, support and technical assistance (*NW*, Jan. 23, page 1).

Typically, eliminating one bottleneck leads to the creation of another in a different area. You've got to smash each bottleneck until maximum performance is achieved. And the support that a vendor offers can be a good source of information in helping to crash the bottlenecks.

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Unreliable

Of the 21 vendors surveyed, those that do not offer automatic recovery from memory faults are:

- Apple
- Cubix
- HP
- IBM
- Integrix
- Tatung Science & Technology
- Tricord

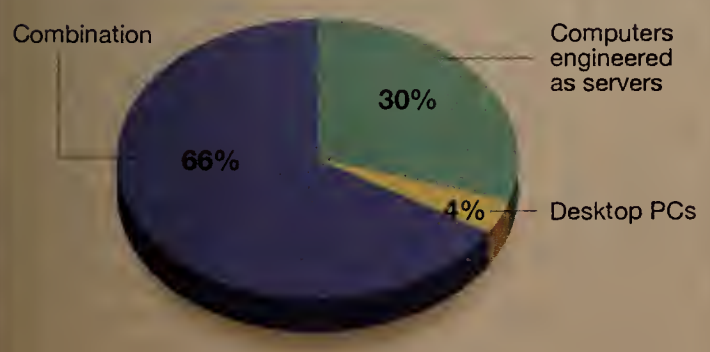
Vendors that do not support recovery from other faults include:

- Acer America
- Advanced Logic Research
- Apple
- Integrix
- NEC

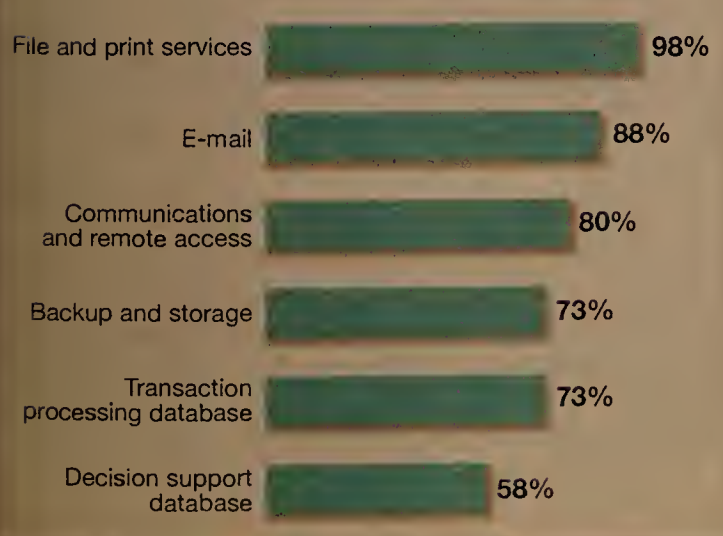
Reader views on servers

Based on 100 interviews.

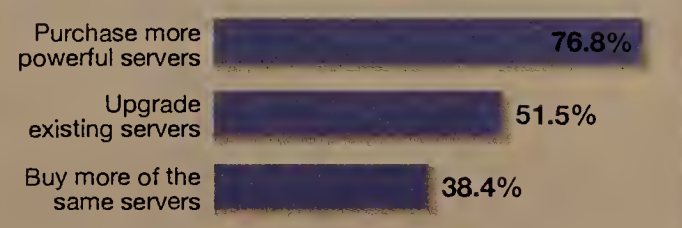
Which type of server do/will you primarily use?



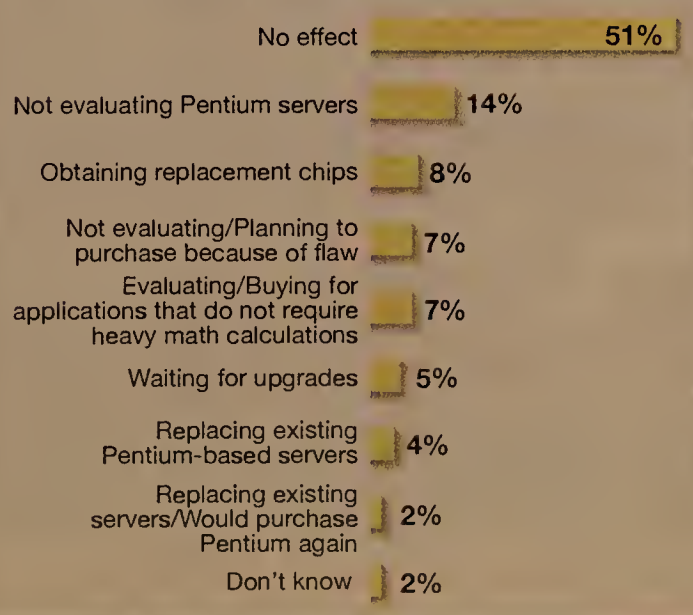
How do/will you use your network servers?



When adding to your network services, how do/will you accommodate for the additional processing?



What effect did/does the flaw in Pentium chips have in your decision to use/purchase Pentium-based servers?



Key selection and purchasing criteria

Based on a highest possible score of 10.

Next-day availability of replacement parts	8.20
Expandability	8.01
Manageability	7.88
Fault tolerance	7.70
Maintenance and upgrades	7.06
Price	6.86

Importance of server technologies

Based on a highest possible score of 10.

Fast Wide SCSI-2	7.32
ECC memory	7.24
RAID/Intelligent Drive Arrays	7.03
Use of newest and most powerful processor type	7.02
Support for fast Ethernet, FDDI and ATM adapters	6.70
EISA bus	6.55
PCI bus	6.16
SMP	5.56
ASMP	5.24

Focus Data, an independent market research firm in Framingham, Mass., conducted this survey. Focus Data specializes in gathering primary data from end-user organizations regarding their enterprise network environment needs. For more information about Focus Data services, call Mona Dabbon at (508) 626-2556.

GRAPHIC BY SUSAN SLATER

Servers

Company	Product	CPU		Multi-processing	Operating environments	Network environments	RAM		Type cache	Bus type: E = EISA I = ISA M = MCA P = PCI PR = Proprietary S = System interconnect O = Other			Storage		Internal/ external storage capacity (bytes)	Network adapters	Mgmt.	Price/ Warranty (months)	Config-uration
		Type/Word length (bits) 8 = 80486 P = Pentium R = RISC O = Other	CPUs per chassis/ Top speed (MHz)	A = Asymmetric C = Clustering S = Symmetric	D = DOS OS = OS/2 U = Unix W = Windows NT O = Other	LM = LAN Manager LS = LAN Server N = NetWare NF = NFS V = VINES W = Windows NT O = Other	Max. amount of memory (bytes)	ECC	Amount (bytes) D = Disk P = Processor	Type: Max. no. of buses	Type: Width (bytes)/ Speed (MHz)	Max. no. of slots for max. no. of buses	F = Floppy OP = Optical S1 = SCSI-1 S2 = SCSI-2 T = Tape O = Other	RAID level	M = Magnetic O = Optical	E = Ethernet F = FDDI S = Serial T = Token ring O = Other	Agent: P = Proprietary S1 = SNMPv1 S2 = SNMPv2 O = Other		C = No. of CPUs R = RAM (bytes) S = Storage (bytes)
Acer America Corp. (800) 233-2227	AcerAltos 800/p	P/64	1/90		D, OS, U, W, O	N, W	128M		D: 4M P: 256K	E: 5 P: 3 S: 1	E: 32/8.33 P: 32/33 S: 32/33	7	F, OP, S1, S2, T, O	0, 1, 5	M: 10G/ 176.4G O: NA	E, F, S, T, O		$2,994/36	C: 1 R: 16M S: NA
	AcerAltos 7000/p	P/64	2/90	S	D, OS, U, W, O	N, W	256M		D: 4M P: 512K	E: 5 P: 3 S: 1	E: 32/8.33 P: 32/33 S: 32/33	7	F, OP, S1, S2, T, O	0, 1, 5	M: 22G/ 176.4G O: NA	E, F, S, T, O		$4,980/36	C: 1 R: 32M S: NA
	AcerAltos 17000	P/64	4/60	S	D, OS, U, W	LM, N, NF, V, W, O	512M	✔	D: 4M P: 256K	E: 8 I: 2 PR: 6	E: 32/8.33 I: 16/8.33 PR: 64/33	16	F, OP, S1, S2, T	0, 1, 5	M: 14.7G/ 176.4G O: NA	E, F, S, T, O		$9,957/36	C: 1 R: 16M S: NA
Advanced Logic Research, Inc. (800) 444-4257	Revolution Q-4SMP	P/16	4/100	S	D, OS, U, W, O	LM, LS, N, NF, V, W	1G	✔	D: NA P: 512K	E: 10 PR: 5 O: 3	E: 32/8.25 PR: 64/33 O: 32/33	15	F, S2, T	0, 1, 5	M: 8G/NA O: NA	E, F, S, T, O		$6,495/12	C: 1 R: 16M S: NA
	Revolution Q-2SMP	P/16	2/100	S	D, OS, U, W, O	LM, LS, N, NF, V, W	1G	✔	D: NA P: 512K	E: 10 PR: 5 O: 3	E: 32/8.25 PR: 64/33 O: 32/33	13	F, S1, S2, T	0, 1, 5	M: 8G/NA O: NA			$5,995/12	C: 1 R: 16M S: NA
	Revolution MP	8/(1) P/(1)	2/100	S	D, OS, U, W, O	LM, LS, N, NF, V, W	512M		D: NA P: 512K	E: 6 P: 4 PR: 1	E: (1) P: (1) PR: (1)	11	F, S1, S2, T	0, 1, 5	M: 8G/NA O: NA			$4,195/12	C: 1 R: 8M S: NA
Apple Computer, Inc. (408) 862-3385	Workgroup Server 6150	R/32	1/60		O	(2)	72M		D: NA P: 256K	O: 1	O: 32/20	1	F, OP, S1	0, 1	M: 1G/NA O: 650M/NA	E, F, S, T, O		$3,000/12	C: 1 R: 8M S: 500M
	Workgroup Server 8150	R/32 O/32	1/80		O	(2)	256M		D: NA P: 256K	PR: 1 O: 3	PR: 32/40 O: 32/20	4	F, OP, S1, S2, T	0, 1	M: 4G/NA O: 650M/NA	E, F, S, T, O		$4,500/12	C: 1 R: 8M S: 500M
	Workgroup Server 9150	R/32 O/32	1/80		O	(2)	256M		D: NA P: 512K	PR: 1 O: 4	PR: 32/40 O: 32/20	5	F, OP, S1, S2, T	0, 1	M: 10G/NA O: 650M/NA	E, F, S, T, O		$5,500/12	C: 1 R: 8M S: 2G
AST Computer, Inc. (800) 876-4278	Manhattan G560	P/32	1/60	C	D, OS, U, W, O	LM, LS, N, NF, V, W	128M		D: NA P: 256K	I: 4 P: 3	I: 16/(3) P: 32/30	7	F, OP, S1, S2, T		M: 12G/NA O: NA	E, T	S1	$3,824/36	C: 1 R: 16M S: 1G
	Manhattan P5090	P/32	2/90	C, S	D, OS, U, W, O	LM, LS, N, NF, V, W	256M	✔	D: 64M P: 256K	E: 6 P: 2	E: 32/(3) P: 32/33	8	F, OP, S1, S2, T	0, 1, 5	M: 24G/120G O: NA	E, T	S1, O	$5,986/36	C: 1 R: 16M S: 1G
	Manhattan V5090	P/32	2/90	C, S	D, OS, U, W, O	LM, LS, N, NF, V, W	256M	(4)	D: NA P: 256K	E: 5 P: 2	E: 32/(3) P: 32/33	8	F, OP, S1, S2, T	0, 1, 5	M: 24G/120G O: NA	E, T	O	$5,003/36	C: 1 R: 16M S: 1G
AT&T Global Information Solutions (800) 421-7942	Globalyst Server 3404	P/32	1/90		D, OS, U, W	LM, LS, N, NF, W	128M		D: NA P: 256K	E: 4 P: 2	E: 32/8.33 P: 32/33	7	F, OP, S2, T, O	0, 1, 5	M: 6G/4G O: NA	E, S, T, O		$3,510/36	C: 1 R: 16M S: 1G
	Globalyst Server 3416 XL	P/32	2/90	S	D, OS, U, W	LM, LS, N, NF, W	384M	(4)	D: NA P: 512K	E: 8	E: 32/8.33	8		0, 1, 5	M: 16G/16G O: 600M/NA	E, S, T, O	P	$6,270/36	C: 1 R: 16M S: 1G
Auspex Systems, Inc. (800) 735-3177	NS 7000 Series 200 Network Data Server	O/32	4/90		U	NF	384M	✔	D: NA P: 384M	S: 1 O: 1	S: 32/20 O: 16/40	6	S2, T, O	0, 1, 10	M: 12G/61G O: NA	E, F	S1	$84,390/3 or 12	C: 3 R: 96M S: 1.75G
	NS 7000 Series 500 Network Data Server	O/32	9/90		U	NF	384M	✔	D: NA P: 384M	S: 1 O: 1	S: 32/20 O: 16/40	14	S1, T, O	0, 1, 10	M: 174G/534G O: NA	E, F	S1	$145,390/ 12	C: 3 R: 96M S: 3G
Compaq Computer Corp. (800) 345-1518	Compaq ProLiant 1000, Compaq ProLiant 1000R	8/32 P/32	1/66		O	LM, LS, N, NF, V, W	128M		D: 4M P: 256K	E: 1 PR: 1	E: 32/8.3 PR: 64/33	7	F, OP, S2, T	0, 1, 5, 10	M: 21.5G/ 240G O: NA	E, T	S1	$4,469- $9,294/36	C: 1 R: 16M S: 1.05G
	Compaq ProLiant 2000, ProLiant 2000R	P/32	2/90	S	O	LM, LS, N, NF, V, W	512M	✔	D: 4M P: 512K (5)	E: 1 PR: 1 O: 1	E: 32/8.3 PR: 64/33 O: 128/33	11	F, OP, S2, T	0, 1, 5, 10	M: 21.5G/ 300G O: NA	E, T	S1	$7,240- $16,962/ 36	C: 1 R: 32M S: 1.05G
	Compaq ProLiant 4000, Compaq ProLiant 4000R	P/32	4/66	S	O	LM, LS, N, NF, V, W	512M	✔	D: 4M P: 512K (5)	E: 1 PR: 1 O: 1	E: 32/8.3 PR: 64/33 O: 128/33	13	F, OP, S2, T	0, 1, 5, 10	M: NA/300G O: NA	E, T	S1	$11,384- $18,244/ 36	C: 1 R: 64M S: 1.05G
	Compaq ProSignia	8/32 P/32	1/66		D, OS, U, W, O	LM, LS, N, NF, V, W	128M		D: 4M P: 256K	E: 1 PR: 1	E: 32/8 PR: 64/33	7	F, OP, S2, T	0, 1, 5, 10	M: 30.1G/ 240.8G O: NA	E, T	S1	$4,770/ (1)	C: 1 R: 16M S: 1.05G
	Compaq ProSignia 500	P/32	1/90		D, OS, U, W, O	LS, N, NF, V, W	144M	(4)	D: 4M P: 256K	E: 1 P: 1 PR: 1	E: 32/8 P: 32/133 PR: 64/60	5	F, OP, S2	0, 1, 5, 10	M: 30.1G/ 240.8G O: NA	E, T	S1	$4,471- $8,068/36	C: 1 R: 16M S: 2.1G
	Compaq ProSignia VS	8/32	1/66		D, OS, U, W, O	LS, N, NF, V, W	128M		D: 4M P: 256K	E: 1 PR: 1	E: 32/8 PR: 32/33	5	F, OP, S2, T	0, 1, 5, 10	M: 17.2G/ 180.6G O: NA	E, T	S1	$1,376- $3,693/ (1)	C: 1 R: 16M S: 535M
Cubix Corp. (800) 829-0550	Multiserv/FT	P/32	4/60		D, OS, W, O	LM, LS, N, NF, V, W	192M		D: NA P: 256K	E: 8 I: 8	E: 32/8.3 I: 16/8	15	F, OP, S2	1	M: 16.8G/NA O: 2.1G/16.8G	E, F, S, T, O	S2	$10,000/ 12	C: 1 R: 16M S: 250M
Data General Corp. (800) 328-2436	AV 8500 Plus	P/32	8/50	S	U	LM, N, NF	2G	✔	D: NA P: 1M- 8M	O: 10	O: 32/2G	9	OP, S1, S2, T, O	0, 1, 3, 5, 10	M: 20G/NA O: NA	E, F, S, T, O	P, S1	$40,995/ 12	C: 2 R: 64M S: 520M
	AV 9500 Plus	P/32	16/50	S	U	LM, N, NF	2G	✔	D: NA P: 1M- 8M	O: 10	O: 32/2G	20	OP, S1, S2, T, O	0, 1, 3, 5, 10	M: 20G/NA O: NA	E, F, S, T, O	P, S1	$84,995/ 12	C: 2 R: 12M S: 520M
Dell Computer Corp. (800) 613-3355	PowerEdge SP 5902	P/64	2/90	S	D, OS, U, W	LM, LS, N, NF, V, W	512M	(4)	D: NA P: 512K	E: 1 P: 1 PR: 1	E: 32/8.33 P: 64/30 PR: 64/(1)	7	F, OP, S1, S2, T	0, 1, 4, 5, 10	M: 8G/112G O: 2.6G/NA	E, F, S, T, O	P	$6,869/36	C: 1 R: 8M S: 535M
Digital Equipment Corp. (800) 344-4825	AlphaServer 1000 4/200	R/64	1/200	C	U, W, O	W	512M	✔	D: NA P: 2M	E: 7 P: 2	E: 32/8 P: 32/33	10	F, OP, S2, T, O	0, 1, 2, 5	M: 14G/168G O: NA/342G	E, F, S, T, O	P, S1	$15,970/ 36	C: 1 R: 64M S: 2.1G
	AlphaServer 2000 4/200	R/64	2/190	S	U, W, O	NF, W	640M	✔	D: NA P: 1M	E: 7 P: 3 S: 4	E: 32/8.33 P: 32/33 S: 128/42	14	F, OP, S2, T, O	0, 1, 2, 3, 5	M: 16G/200G O: NA	E, F, S, T, O	P, S1	$18,070/ 36	C: 1 R: 64M S: 2G
	AlphaServer 2100 4/200	R/64	4/190	C, S	U, W, O	NF, W	2G	✔	D: NA P: 1M	E: 8 P: 3 S: 7	E: 32/8.33 P: 32/33 S: 128/42	18	F, OP, S2, T	0, 1, 2, 5	M: 32G/200G O: NA/342G	E, F, S, T, O	P, S1	$21,940/ 36	C: 1 R: 64M S: 2G

Servers

Company	Product	CPU		Multi-processing	Operating environments	Network environments	RAM		Type cache	Bus type: E = EISA I = ISA M = MCA P = PCI PR = Proprietary S = System interconnect O = Other			Storage		Internal/ external storage capacity (bytes)	Network adapters	Mgmt.	Price/ Warranty (months)	Config-uration
		Type/Word length (bits) 8 = 80486 P = Pentium R = RISC O = Other	CPUs per chassis/ Top speed (MHz)	A = Asymmetric C = Clustering S = Symmetric	D = DOS OS = OS/2 U = Unix W = Windows NT O = Other	LM = LAN Manager LS = LAN Server N = NetWare NF = NFS V = VINES W = Windows NT O = Other	Max. amount of memory (bytes)	ECC	Amount (bytes) D = Disk P = Processor	Type: Max. no. of buses	Type: Width (bytes)/ Speed (MHz)	Max. no. of slots for max. no. of buses	F = Floppy OP = Optical S1 = SCSI-1 S2 = SCSI-2 T = Tape O = Other	RAID level	M = Magnetic O = Optical	E = Ethernet F = FDDI S = Serial T = Token ring O = Other	Agent: P = Proprietary S1 = SNMPv1 S2 = SNMPv2 O = Other		C = No. of CPUs R = RAM (bytes) S = Storage (bytes)
Digital Equipment Corp.	AlphaServer 2100 4/275	R/(1)	4/275	C, S	U, W, O	NF, W	2G	✔	D: NA P: 4M	E: 8 P: 3 S: 7	E: 32/8.33 P: 32/33 S: 128/42	18	F, OP, S2, T, O	0, 1, 2, 5	M: 32G/NA O: NA/342G	E, F	P, S1	$33,390/ 36	C: 1 R: 64M S: 2G
	DEC 7000 Model 700	R/64	6/275	C, S	U, O	NF	14G	✔	D: NA P: 4M	PR: 4 S: 1	PR: 32/33 S: 128/50	48	F, OP, S2, T, O	0, 1, 3, 5	M: 58.8M/19T O: NA	E, F, S, T, O	P, S1	$137,652/ 12	C: 1 R: 128M S: NA
Hewlett-Packard Co. (800) 322-4772	HP NetServer LC	8/32 P/32	1/100		D, OS, U, W	LM, LS, N, V, W	136M		D: NA P: 16K	E: 4 P: 1 O: 1	E: 32/33 P: 32/133 O: 32/(1)	6	F, OP, S2, O	0, 1, 5	M. 8.4G/NA O: NA	E, S, T		$2,420/36	C: 1 R: 8M S: 540M
	HP NetServer LF	8/32 P/32	1/100		D, OS, U, W	LM, LS, N, V, W	192M		D: NA P: 16K	E: 7 P: 21	E: 32/33 P: 32/133	9	F, OP, S2, O	0, 1, 5	M: 16G/NA O: NA	E, S, T		$3,572/36	C: 1 R: 8M S: 1G
	HP NetServer LM	8/32 P/32	2/100	S	D, OS, U, W, O	LM, LS, N, NF, V, W	384M	(4)	D: NA P: 256K	E: 8	E: 32/33	8	F, OP, S2, T	0, 1, 5, 10	M: 16G/NA O: NA			$4,841/36	C: 1 R: 16M S: 1G
IBM (800) 426-3333	IBM Server 95/Server 95 Array	8/16 P/16	1/66		D, OS, U, W	LM, LS, N, NF, V, W	256M	✔	D: 4M P: 256K	M: 1	M: 32/40	8	F, OP, S1, S2, T	0, 1, 5	M: 10G/94G O: 2G/32G	E, F, S, T, O	S2	$5,525/36	C: 1 R: 16M S: 1G
	IBM PC Server 300	8/16 P/16	1/66		D, OS, U, W	LS, N, NF, V, W	196M		D: NA P: 512K	E: 1 P: 1	E: 32/33 P: 32/132	8	F, OP, S1, S2, T	1	M: 14G/56G O: NA	E, T	S2	$2,499/36	C: 1 R: 8M S: NA
	IBM PC Server 500	P/16	1/90		D, OS, U, W	LM, LS, N, NF, V, W	256M	✔	D: 4M P: 256K	M: 1	M: 32/40	8	F, OP, S1, S2, T	0, 1, 5	M: 40.5G/ 124.5G O: 2G/32G	E, F, S, T, O	S2	$8,999/36	C: 1 R: 32M S: NA
	IBM RISC System/6000 Model G30	R/32	4/75	S	U	NF, V	512M	✔	D: NA P: .5M	M: 1 PR: 1 S: 1	M: 64/20 PR: 256/75 S: 320/25	6		0, 1, 3, 5	M: 15.6G/ 350G O: NA	E, F, S, T, O		$37,900/ 12	C: 2 R: 32M S: 1.1G
	IBM RISC System/6000 Model R30	R/32	4/75	S	U	NF, V	2G	✔	D: NA P: 1M	M: 2 PR: 1 S: 1	M: 64/20 PR: 256/75 S: 320/75	16		0, 1, 3, 5	M: NA O: NA	E, F, S, T, O		$80,900/ 12	C: 2 R: 64M S: 1.1G
	IBM RISC System/6000 Model J30	R/32	4/75	S	U	NF, V	2G	✔	D: NA P: 1M	M: 2 PR: 1 S: 1	M: 64/20 PR: 256/75 S: 320/75	15		0, 1, 3, 5	M: 3G/886G O: NA	E, F, S, T, O		$67,000/ 12	C: 2 R: 64M S: 2.2G
Integrix, Inc. (800) 300-8288	SWS 5/85 Sparc Server	R/32	1/85	C	U	NF	256M		D: NA P: 24K	O: 5 O: 1	O: 32/25 O: 64/25	6	F, OP, S2, T		M: 12G/NA O: 644M/100G	E, F, S, T, O	P	$3,500/12	C: 1 R: 16M S: 1G
Large Storage Configurations, Inc. (800) 831-9482	Integrated Data Server 1000	O/32	16/33	A	U	NF	512M	✔	D: NA P: 32M	O: 1	O: 64/16	16	S2, T	0, 1, 5	M: 1.152T/ 1.152T (6) O: 112G/ 5.762P	E, F, O	P	$48,000/ (1)	C: 1 R: 32M S: 4.4G
NEC Technologies, Inc. (800) 632-4636	RISCserver 2200	R/64	2/200	S	W	W	512M	✔	D: NA P: 2M	E: 6 I: 6 PR: 1	E: 32/33 I: 16/8 PR: 64/400	7	F, OP, S2, T	0, 1, 5	M: 40M/120M O: 1G/3G	E, F, S, T, O		$10,000/ (1)	C: 1 R: 32M S: 1G
Plexcom, Inc. (805) 522-3333	Quantum Net Q6000	8/32	18/ 100	C, S	D, OS, U, W	LM, LS, N, NF, V, W	3.84G	(4)	D: NA P: 512K	E: 7 P: 4 PR: 1	E: 32/33 P: 32/132 PR: 8/25	14	F, OP, S2, T	5	M: 28G/ Unlimited O: 8G/ Unlimited	E, F, S, T, O	S1, S2, O	$1,825- $4,100/ 12	C: 1 R: 4M S: 540M
Polywell Computers, Inc. (800) 999-1278	Poly 275AXP	R/28	1/275		U, W	W	2M		D: 1M P: 2M	I: 4 P: 3	I: 16/10 P: 32/33	7	F, S2, T, O	0, 1, 2, 5	M: 63G/300G O: 2G/7G	E, F, S	P	$12,500/ 24	C: 1 R: 2M S: 5G
	Dual 5100EP4	P/64	2/100	A, S	D, U, W	W	512K		D: 16M P: 512K	E:6 I: 6 P: 3 S: 1	E: 32/8.33 I: 16/11 P: 32/33 S: 32/33	9	F, OP, S2, T	0, 1, 2, 5	M: 63G/ 8.4T O: 2G/14G	E, F, S, T	P	$12,500/ 36	C: 2 R: 512K S: 5G
Tatung Science & Technology, Inc. (800) 659-5902	SuperCOMPstation 20 Series	R/32	4/75	S	U	NF	512M	✔	D: NA P: 1M	O: 4	O: 32/64	4	F, S2			E, S	P	$14,400/ 12	C: 1 R: 32M S: 1G
Tricord Systems, Inc. (612) 551-6630	DS1000	8/32 P/32	2/100	S	D, OS, U, W, O	LM, LS, N, NF, V, W	384M	(4)	D: 64M P: 512K	E: 1 S: 1	E: 32/33 S: 32/132	10	NA	0, 1, 5, 10	M: 16G/56G O: NA	E, F, S, T, O	P, S2, O	$7,715/36	C: 1 R: (1) S: 1G
	DS1500	8/32 P/32	2/100	S	D, OS, U, W, O	LM, LS, N, NF, V, W	384M	✔	D: 64M P: 512K	E: 1 S: 1	E: 32/33 S: 32/132	10	NA	0, 1, 5, 10	M: 38G/576G O: NA	E, F, S, T, O	P, S2, O	$13,495/ 36	C: 1 R: (1) S: 1G
	ES3000	8/32 P/32	4/100	S	D, OS, U, W, O	LM, LS, N, NF, V, W	1G	✔	D: NA P: 512K	E: 1 S: 1	E: 32/33 S: 64/267	17	NA	0, 1, 4, 5, 10	M: 38G/576G O: NA	E, F, S, T, O	P, S2, O	$32,710/ 36	C: 1 R: 32M S: 1G
	ES4000	8/32 P/32	6/100	S	D, OS, U, W, O	LM, LS, N, NF, V, W	1G	✔	D: NA P: 512K	E: 1 S: 1	E: 32/33 S: 64/267	19	NA	0, 1, 4, 5, 10	M: 38G/ 1.512T O: NA	E, F, S, T, O	P, S2, O	$51,200/ 36	C: 1 R: NA S: 1G
	ES5000	8/32 P/32	6/100	S	D, OS, U, W, O	LM, LS, N, NF, V, W	1G	✔	D: NA P: 512K	E: 1 S: 1	E: 32/33 S: 64/267	19	NA	0, 1, 4, 5, 10	M: 144G/ 1.512T O: NA	E, F, S, T, O	P, S2, O	$77,750/ 36	C: 1 R: NA S: 1G
Zenith Data Systems Corp. (800) 582-0524	Z-Server GT	P/64	4/90	S	D, OS, U, W, O	LM, LS, N, NF, V, W	1.02G	✔	D: 1M P: 512K	E: 3 I: 1 P: 2	E: 64/33 I: 32/(1) P: 64/132	8	F, S1, S2	0, 1, 5	M: 24G/NA O: NA			$13,490/ 36	C: 1 R: 16M S: 1G
	Z-Server EX	P/64	2/90	S	D, OS, U, W, O	LM, LS, N, NF, V, W	768M	(4)	D: 1M P: 512K	E: 4 I: 2 P: 2	E: 64/33 I: 32/(1) P: 64/132	8	F, OP, S2	0, 1, 5	M: 12G/NA O: NA	E, F, T, O	O	$6,269/36	C: 1 R: 16M S: 1G

Chart compiled by Cheri Paquet

Products highlighted by color were selected for The Short List.

FOOTNOTES:

(1) Vendor did not supply information.
(2) Runs on a Macintosh operating system.
(3) Maximum is the industry standard.
(4) Provided as an option.
(5) 2.5M bit/sec optional.
(6) T = Terabyte; P = Petabyte.

ECC = Error checking and correcting
EISA = Extended ISA
ISA = Industry Standard Architecture
MCA = Micro Channel Architecture
NA = Not applicable
NFS = Network File System
PCI = Peripheral Component Interconnect
RISC = Reduced Instruction Set Computing
SCSI = Small Computer System Interface

Remote possibilities

This sequel to our probe of Windows remote control software finds four products that fail to rise to the top of the pack.

NETWORK WORLD TEST alliance

By Lee Schlesinger

Our pursuit of remote control software for enterprise networks brings us this week to four products that demonstrate their strong points but fail to match the range of features and ease of use we found in last week's top prospects — Symantec Corp.'s Norton pcAnywhere for Windows and Traveling Software, Inc.'s LapLink for Windows.

This week, we'll look at four more Windows-based remote access products. Microcom Corp.'s Carbon Copy is the best enterprise solution of the bunch, with top performance and a robust feature set. Triton Technologies, Inc.'s CoSession for Windows, on the other hand, supports only dial-in remote control, and even that was comparatively slow. Stac Electronics ReachOut Division's ReachOut Remote Control Pro Edition also was slow and unstable in our test, and its documentation and on-line help are poorly done. Finally, Avalan Technology, Inc.'s Remotely Possible is a solid but unremarkable alternative for remote dial-up or LAN access.

CARBON COPY

Carbon Copy is a good choice for enterprise users. With a few enhancements, it could jump to the top of its field. Carbon Copy was the only application we looked at besides pcAnywhere that documents ways to perform a network installation. Net managers can perform either an administrative installation, allowing them to install individual copies from a network directory, or a shared installation, allowing all network users to share files in the same directory. Users can, of course, install the application on stand-alone personal computers, as well.

The Carbon Copy installation routine won't install the product if it finds evidence of another remote control product's drivers in SYSTEM.INI. Instead, it backs off and asks the user to remove the conflicting application.

Users can choose a serial port or LAN installation. For each, users must configure the appropriate parameters, including the serial port or LAN protocol. The installation process optionally converts any Carbon Copy for DOS files and optionally adds support for Carbon Copy's DOS host terminate and stay resident (TSR) to AUTOEXEC.BAT. The installation routine makes numerous changes to SYSTEM.INI, primarily to add a host of drivers.

After installation, users can choose from separate icons to invoke Guest, Host and Terminal Emulator programs. The Guest and Host applications display a similar interface with eight large icons (see Figure 3, page 43).

Users can choose to call another PC, wait for a call, run remote control, file transfer or chat, or change their phone book or password table entries.

With remote control active, users cannot perform file transfers or chat, and only one activity can be run at a time. Remote control performance, as measured by our WordBasic macro, trailed only blazingly fast LapLink on our parallel port test and fell solidly in the middle of the performance range for products in our serial port tests.

> Carbon Copy was the only application we looked at besides pcAnywhere that documents ways to perform a net installation.

The file-transfer application is configured with the local system on the top of the screen and the remote system on the bottom. File transfer is not as full-featured as some of the other programs. While it offers drag-and-drop, users cannot move whole subdirectories, synchronize directories or rename remote files.

In the file-transfer throughput tests, Carbon Copy outperformed the competition with compressed files on both serial and parallel port connections, and was near the top on uncompressed files, as well.

We liked Carbon Copy's terminal emulator. Although it offers only ANSI, TTY and VT-100 emulations, it lets users record scripts for various connections, edit them and save them in a phone book to speed future connections. The interface includes buttons for many common functions, including uploading and downloading files.

Carbon Copy's chat function is more "polite" than those of the other programs in that it doesn't automatically bring up a chat window on the remote end. Instead, it requests that the remote user enter a chat session.

Here, too, the local user's typing appears above the remote user's words in a horizontally split chat window.

Carbon Copy's support of Microcom's own parallel port modems is poorly documented. In fact, the documentation is incorrect. We were able to get our installation working only after a call to Microcom's knowledgeable technical support staff. The solution, it turned out, required running a TSR asynchronous communications server driver before entering Windows and

NET Result

Product	Carbon Copy 2.5	CoSession for Windows 1.0	ReachOut Remote Control Pro Edition 4.02	Remotely Possible 4.0
Pros	▸ Network installation. ▸ Full-featured terminal emulator. ▸ Excellent file-transfer performance.	▸ Offers drive redirection.	▸ Built-in virus checker. ▸ Offers drive redirection.	▸ Provides write-only security for upload directories. ▸ Clean and simple interface.
Cons	▸ Use of parallel port modem incorrectly documented.	▸ Uses large amount of conventional memory. ▸ No parallel modem support. ▸ Poor remote control performance.	▸ Uses large amount of conventional memory. ▸ No parallel modem support.	▸ Low performance on remote control and file-transfer tests.
Price	$199	$199	$199 for Modem version (host and viewer), or $119 for viewer or $149 for host; $295 for Network version with 4-user license or $1,995 with 100-user license	$199 for Dial version (host and viewer), or $129 for either host or viewer; $599 for LAN version licensed for all PCs in a building, with free Dial package for each PC
Vendor	Microcom 500 River Ridge Drive Norwood, Mass. 02062 (800) 822-8224 (617) 551-1000	Triton Technologies, Inc. 200 Middlesex Turnpike Iselin, N.J. 08830 (908) 855-9608	Stac Electronics, ReachOut Division 1201 19th Place Vero Beach, Fla. 32960 (407) 770-4777	Avalan Technology P.O. Box 6888 Holliston, Mass. 01746 (800) 441-2281 (508) 429-6482

choosing NCSI/NASI as the connection type.

The TSR for Carbon Copy's DOS Host feature is unusually large at 90K bytes, but it can be loaded above conventional memory. Remote users accessing a DOS host can perform full-screen DOS remote control, a feature that not all the other products offer.

Carbon Copy's lack of remote drive redirection is a shame, but the product makes up for this in part with a remote clipboard feature that lets users copy data from a remote system to the Windows clipboard and paste it locally, or vice versa.

Remote control performance

Figure 1

Notes: ReachOut would not run serial or parallel. CoSession would not run parallel. Smaller bars indicate better performance.

GRAPHIC BY SUSAN SLATER

COSESSION

CoSession for Windows is handicapped by its large DOS memory requirement, its limitation to serial port modem connections (there's no Windows LAN version) and some unexpected glitches. A new Version 2.0 of CoSession for Windows, due this spring, is expected to include network support for IPX, NETBIOS and TCP/IP protocols, as well as many interface and security enhancements.

CoSession for Windows currently allows only modem connections but solely for serial port modems. Triton Technologies offers another product, CoSession LAN II, for net connections over IPX, NETBIOS or TCP/IP networks, but it is not Windows-based.

The CoSession installation routine allows users to install support for remote use, host use or both. It requires host users or those wishing to use drive redirection to run one of six provided batch files before entering Windows. The host TSR consumes 80K bytes of memory; the drive map TSR takes 37K bytes. The installation procedure changes the SYSTEM.INI keyboard and other device drivers, saving a copy of the old version.

After installation, when the host TSR program is running, the CoSession chat applet comes up automatically when Windows is invoked. Users can choose remote or host icons from the CoSession group; there is no terminal emulator. Both applications bring up a Control Center window with a number of large icons that let users make or wait for a call, run remote control, file transfer or chat, or change phone book settings (see Figure 4, page 43).

Host users may set passwords that are required to access the users' PCs. A weak link here is in the security configuration screen; passwords are displayed without encryption to any user who accesses this screen. The phone book itself may be protected with a password, however, to minimize this risk.

Remote control performance, as measured by our WordBasic macro, was at the bottom of the list in our serial port trials.

CoSession was the only application we tested that didn't show elapsed file-transfer time during the transfer. It did show total time after the transfer was complete. Our timings showed file transfer to be a bit on the sluggish side. CoSession took 250 seconds compared to 165 seconds for the top performers.

CoSession's documentation shows some lack of attention to detail. For example, nowhere is it mentioned whether user passwords are case-sensitive (although the documentation states that the phone book password is case-sensitive); the appendix on postconnection scripts is only two pages long and contains no examples; and the pages on the MAPDRV command, which provides drive redirection, includes parameters that do not actually work with the product.

The drive redirection feature itself, however, works fine. It lets remote users access host drives as if they were local. We found this a very useful feature.

We had a problem using Microsoft Corp.'s Word and Excel with redirected files that caused our system to halt unexpectedly. Triton recognizes this as a problem with these applications.

REACHOUT

Poor performance and the lack of attention to detail left us unimpressed with ReachOut. While the product offers a broad range of supported network protocols and a unique antivirus feature, its instability in our tests was frustrating.

ReachOut comes in both a network version, with a four-user license for both a host and viewer, and a modem version, with a single-user license for both a host and viewer. Initially, we installed the network version on our network and the modem version on our remote PC. We discovered that the remote PC couldn't communicate with the network because this modem capability is not part of the network version. We then went back and installed the modem version on top of the network version on our host PC.

> **CoSession was the only application we tested that didn't show elapsed file-transfer time during the transfer.**

The installation process is simple. After copying the software to the hard drive, ReachOut asks for a name to designate the workstation.

Here we discovered a small problem; when we entered a 15-character name (the maximum length allowed by the program), ReachOut truncated it after 14 characters before saving it.

We were able to fix this later using ReachOut's configuration program, but had we been a little less observant, this might have caused us a great deal of frustration and lost debugging time.

Continued on page 42

Continued from page 41

ReachOut forces users to choose whether they're going to be doing remote control over the network or by modem, and run a batch file for one or the other before entering Windows. We found this irksome when we wanted the PC that had been doing network remote control to then access a different PC connected via modem. We had to exit Windows, change our AUTOEXEC.BAT file and reboot with the network batch procedure. However, we appreciated the fact that ReachOut makes no changes to SYSTEM.INI or WIN.INI files in the Windows directories.

> ReachOut is the only one of the products we looked at that offers optional virus checking during file transfer.

The batch files install a number of TSRs to handle network protocol interpretation and host and remote functions. For our PC to be available under IPX for both hosting and viewing under Windows, three TSRs are required that take up a total of 55K bytes of memory, none of which automatically load in part or in total into high memory. If users want to employ the product under DOS, additional memory is required.

We tried to get back our conventional memory back using both the DOS Memmaker utility and Quarterdeck Office Systems, Inc.'s QEMM 7.5, without success. The lack of memory handicapped us when we tried to run Windows applications; for instance, Symantec's Norton Disk Doctor failed to run, telling us it had inadequate DOS memory, and after starting up just two or three Windows applications, we often ran out of Windows resources and hung up our system. For a dedicated remote access PC on the network, this memory-hogging may not matter much, but for a PC packed with applications, it may pose an untenable burden.

ReachOut worked fine during our testing with an Intel Corp. SatisFAXtion/400 board, but when we used a Microcom DeskPorte Fast parallel port modem, ReachOut failed to detect our communications port's redirection. A call to the vendor verified that ReachOut does not support parallel port modems.

ReachOut's remote control program works fine, although it seemed slower than some of the other packages. Its handiest feature is a remote clipboard that can transfer data from either the host or viewer PC's clipboard to the other.

We were unable to complete our WordBasic macro to judge the speed of ReachOut's viewer. Our connection dropped in the middle of every modem test we ran, and we ran multiple tries over several weeks.

At the vendor's advice, we lowered the data rate from 115.2K to 57.6K and then 38.4K bit/sec, but we continued to have the same problem. Based on the apparent progress of the macro at the point where it stopped, ReachOut was at the high end of the time scale, at about 7 minutes.

ReachOut has a terminal-emulation program that performs all the basic functions of the Windows Terminal accessory plus a few extra. It uses ReachOut's phone book for frequently dialed numbers, it can optionally perform a virus check on files being downloaded using the vendor's own antivirus software, and it has a scripting language for automating connections. Unfortunately, Stac Electronics doesn't provide any example scripts, and there's no facility for recording scripts based on user actions. The terminal emulator provides only ANSI, TTY, VT-52 and VT-100 emulations.

ReachOut's file-transfer utility displays two directory trees, one above the other, and lets users tag or drag files to be copied between systems. Users can specify criteria based on file names, extensions and dates. In our tests, transfer throughput was at or near the bottom of the group in each test.

ReachOut is the only product we looked at that offers optional virus checking during file transfer. This is a welcome feature for those who don't use DOS' bundled antivirus software or a package from a third party, although it was impossible for us to evaluate how well it performs its tasks.

Included in the software is a scanner with more than 2,000 virus signatures; the signature

HOW WE *did it*

We installed each product on two Compaq ProLinea 4/66s with 8M bytes of RAM on a Novell NetWare 3.12 network in our lab at *Network World*. We used Quarterdeck's QEMM Version 7.5 to optimize memory on our PCs. Our Windows shell was Symantec's Norton Desktop 3.0.

We tested each product under two configurations — across a network and via modem. During our testing, there were no other clients or activity on our network.

To test performance, we obtained two Microcom DeskPorte Fast modems. These V.FC modems came with cables and drivers to attach to a PC's parallel port for theoretically higher throughput than can be obtained through 16550 UART-based serial ports. Because two of the products did not support parallel port modems, we also ran tests with these modems attached to serial ports.

To check out remote control performance, we ran a Microsoft WordBasic macro that made changes to a long text file. There were many repetitive strings in our test file to give products with efficient screen-caching algorithms a chance to show their abilities.

To test file transfers, we sent a 363.5K-byte Excel 5.0 spreadsheet between the remote and networked PCs. We then compressed the spreadsheet using PKware's PKzip 2.04g down to 103.9K bytes and transferred the compressed file to see how well the products performed with uncompressable data.

Remote control feature comparison

Figure 2 NA = Not applicable

Feature	Carbon Copy	CoSession	ReachOut	Remotely Possible
INSTALLATION				
Changes AUTOEXEC.BAT	Option			Option
Changes SYSTEM.INI	✔	✔		✔
TSR required		✔	✔	
Uninstall utility	✔			Documented
LINK METHODS				
Serial cable				✔
Modem	✔	✔	✔	✔
Network				
IPX	✔		✔	✔
TCP/IP			✔	
VINES IP			✔	
NETBIOS	✔		✔	✔
NASI/NCSI	✔		✔	✔
Telebit ACS			✔	✔
Interrupt 14h	✔		✔	✔
Voice connection first		✔	✔	✔
DOS SUPPORT				
TSR size (K byte)	90	80	24	32
Remote control	✔	✔	✔	✔
File transfer			✔	
Chat		✔		
Remote mount		✔	✔	
REMOTE CONTROL				
Disable screen, keyboard and mouse	✔	✔	✔	✔
Lock while waiting for connection				
Reboot				
Warm	✔	✔	✔	✔
Cold				
Upon disconnection	✔	✔	✔	✔
Remote clipboard	✔	✔	✔	
FILE TRANSFER				
Directory tree windows	✔	✔	✔	
Can view attributes	✔	✔	✔	
Drag and drop	✔	✔	✔	
Synchronize directories				
Copy command	✔	✔	✔	✔
Move command				
Rename command			✔	
Delete command	✔	✔	✔	
Sort display				
Date	✔	✔	✔	
Name	✔	✔	✔	✔
Extension	✔	✔	✔	
Size	✔	✔	✔	
Filters				
Name	✔	✔	✔	
Extension	✔	✔	✔	
Date			✔	
Option to move subdirectories				
Option to transfer only if file is newer		✔		✔
Option to transfer only if file is present				✔
Clone				
REMOTE MOUNT				
Full access	NA	✔	✔	NA
Read-only access	NA	✔	✔	NA
No access	NA	✔	✔	NA
TERMINAL EMULATOR				
Emulations	3	NA	4	NA
Script files	✔	NA	✔	NA
Binary transfer protocols	Kermit, Xmodem, Ymodem, Zmodem	NA	Kermit, Xmodem, Ymodem, Zmodem	NA
GATEWAY	✔		✔	
SECURITY				
Encryption				
Virus protection			✔	
Login list	✔	✔	✔	✔
Master list password	✔		✔	
User passwords shown unencrypted		✔		
Event logging	✔	✔	✔	✔
Callback				
Set	✔	✔	✔	✔
Roving	✔	✔	✔	
Access restrictions				
By drive			✔	
By directory			✔	
By file				

list is updated quarterly and available on the vendor's bulletin board system or on CompuServe.

Users can remap host drives to viewers' disks, making them seem like locally mapped drive letters. ReachOut can make disks not only read-only, but also optionally write-only. Such access is appropriate for designated upload directories.

ReachOut's chat utility divides a window into two boxes. The local user, regardless of whether the person is using a host or remote system, always types in the bottom window. The utility includes a handy Page menu that sends a clicking sound to the remote PC user to get the person's attention.

Figure 3: Carbon Copy's Host interface lets users not only receive calls, but also call Guests. The Guest interface is virtually identical.

We weren't happy with some of ReachOut's interface features. For example, pressing the Exit button on ReachOut's Host or Viewer screen doesn't exit the program if a link to another PC is in place; instead, it prompts users to click on the Disconnect button, then Exit. There's no reason this couldn't be automatic.

ReachOut's on-line help is often unclear or incorrect. It contains text like, "The Add Password Entry screen is used to add entries to the password list," without any explanation of what a password list might be. In the same help text that contains the information above, a list of field names in the help text appears in a different order than the fields on the screen, and one of the fields, labeled "Description" on the real screen, is called "ID/Comment" in the help text.

ReachOut's communication with the user in general is a bit unsophisticated. The Readme file that appears after the product is installed is full of grammatical errors, as is the on-line help. An error message that appears when you try to invoke Host mode without having loaded appropriate TSRs misspells the word "and" as "an." While these gaffes don't affect the functionality of the product (at least as far as we could tell), they do indicate a lack of attention to detail. We wondered where else that might surface.

REMOTELY POSSIBLE

Remotely Possible gives the impression of having been written by someone with a meticulously logical mind. With the exception of drive redirection, all of the major functions are there but implemented in a linear fashion. Remotely Possible is missing the leaps of innovation found in some of the other products.

As with many of the other applications, Remotely Possible users can install support for the viewer, host or both in a dial-up version and a LAN version. With all options installed, users have a choice of four icons in the Remotely Possible Windows group. The installation procedure changes the display driver in SYSTEM.INI. If the user wants support for DOS remote control, it adds a 32K-byte TSR to AUTOEXEC.BAT.

Remotely Possible's Viewer screen, in both the LAN and modem versions, lacks the pictorial icons of some of the other products. Instead, it features large text buttons that allow users to connect to hosts, wait for a connection, edit address books and passwords, and use remote control, file transfer and chat.

Remotely Possible's remote control performance, as measured by our WordBasic macro, was on the low end of the group, clocking in only 5 seconds faster than the slowest product on the serial port test, and about 10% faster than that on the parallel port test.

Remotely Possible's file-transfer application, like Carbon Copy's, cannot be run at the same time as its remote control or chat functions. The file-transfer screen doesn't display file dates or sizes for the entire list of files in a directory, but rather only for the file highlighted. We found this omission inconvenient.

And users cannot delete files or perform any file management on a host from a viewer. This sharply limits the usefulness of this part of the application.

During file transfers, the screen reports percentage complete and transfer rate in bits per second for both the current and total files being transferred, along with elapsed time. In our benchmarks, file transfer throughput was on the low side.

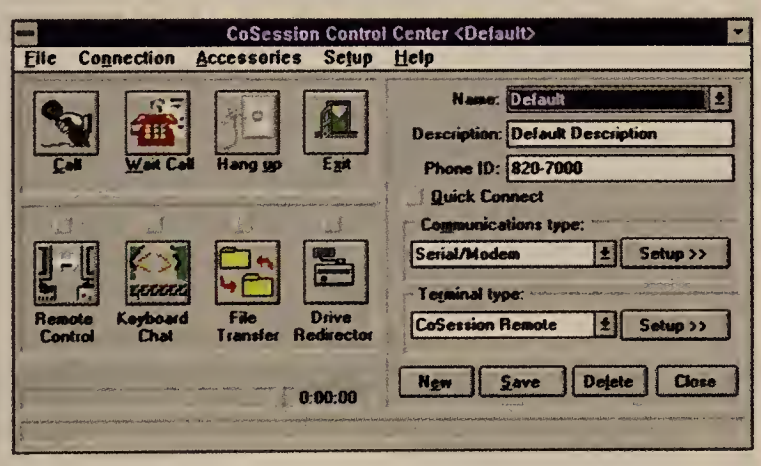


Figure 4: CoSession's Control Center is a single location for all of the product's major features.

Switching the direction of the transfer is more trouble than it needs to be. Instead of simply pointing and clicking on the file to be transferred, users must click on a Send or Receive button before invoking the transfer.

Remotely Possible keeps tabs on connection-line quality and notes whether excessive errors were detected. In such a case, it continues the transfer but gives users the option to abort. This is a thoughtful and worthwhile feature.

The chat application is a horizontally split window that has the local user in the top box. However, neither box is labeled — a curious but not crucial omission.

Continued on page 45

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In-box

Continued from page 29

the only such product we know progressing through a government agency-sponsored endorsement process.

In addition, ACC Systems develops and markets a broad family of local- and wide-area network access products, including our WANstation multiport, multiprotocol communications front ends, which attach directly via high-speed Small Computer System Interface bus to Digital Equipment Corp., Sun Microsystems, Inc. and Hewlett-Packard Co. Unix servers and workstations.

In 1996 (fiscal year ending March 31) ACC Systems' revenues are projected to increase to $13 million from eight million dollars in fiscal 1995, with gross profits of $3.75 million. Exports account for approximately 15% of revenues.

Chris Kleveland
Vice president
ACC Systems
Columbia, Md.

Include Madge

It was great to see the special issue listing the Network World 200, but we were disappointed that Madge Networks, Inc. was not included. I understand the list included only companies that break out their U.S. revenue, and that Madge Networks was dropped because we aren't based in the U.S. However, at a time when vendors fiercely compete to network global customers, I would think a worldwide vendor would have an advantage over a U.S. vendor and would definitely have a place in the graphic.

Madge Networks is a worldwide networking company with a 1993 revenue of $145.4 million. To date, approximately half of our revenue is derived from the U.S. Global Fortune 1000 companies constitute the majority of our customers, and our headquarters is composed of four business centers, located in: London, Hong Kong, Tokyo and San Jose, Calif.

Madge Networks is a recognized leader in the token-ring networking industry and is committed to expanding the token-ring market and lead it into the future through ATM integration.

We'd like to be included in the Network World 200 list in 1995, and as you watch Madge Networks grow this year, we're confident you'll agree.

Patricia Burke
Vice president, marketing
Madge Networks
San Jose, Calif.

What about the ISPs?

I found your "Power Players" issue very interesting reading. However, I noticed one very curious area of omission — Internet service providers (ISP). The big players like Sprint Corp. and MCI Communications Corp. are there, but what about Advanced Networks & Services, Inc. (ANS), UUNET Technologies, Inc. and Performance Systems International, Inc.?

ANS runs NSFNet (at least for a little while longer) and should certainly be big enough to make it onto the list.

I can see smaller and regional nets like NEARNet and BARRNet being too small to make your list, but I'd think that at least the biggest providers would make it, or that you would at least note the curious omission of any ISPs since the Internet is one of the areas of biggest recent growth (and biggest projected growth).

May I make another suggestion? Please do this list again in early or mid-1995 so that you can do it based on the real 1994 numbers, and then make it annual from that point on. Since it's now 1995, it seems rather anachronistic to be basing information and decisions on 1993 data, especially in an industry that has a life cycle of 12 to 18 months.

Brad Knowles
Alexandria, Va.

Calculation off

In your listing of the Network World 200, you highlight the 15 most productive companies by breaking down their revenue per employee (page 6). Rockwell International Corp. is listed at the top of this table with a revenue per employee of $3,498,387. I believe there has been a mistake in your calculations.

It seems that you might have reached your number using the revenue from Rockwell corporate and the employee count from Rockwell Telecommunications.

Rockwell Telecommunications is a business segment of Rockwell Electronics, which is a division of Rockwell International. Revenues are not broken out separately, as evidenced in the annual report.

Julie Seymour
Public relations specialist
Rockwell Telecommunications
Newport Beach, Calif.

Help desk

Continued from page 2

between the two systems. To contact *Windows Sources*, call (800) 597-7889.

Another article you might find useful is "Making the strategic choice: Unix vs. NT vs. OS/2," which is in the *CW* Guide to 32-bit operating systems in the April 11, 1994, issue of *Computer World*. This article covers buyers' satisfaction with operating systems.

I'm sure each manufacturer has a feature comparison chart of their systems as well as numerous other white papers and spec sheets.

I am working on a project that uses 80486-based computers to create an intercommunications system.

We plan to network together many internal stations via a Fiber Distributed Data Interface LAN that will be able to connect to a processor that provides an interface to the public-switched telephone network.

Do you know of any Extended Industry Standard Architecture (EISA)-based cards that will perform all the functions of a typical desktop telephone? If it also provides voice mail capability, that is a plus.

William Kitt, Falls Church, Va.

Glen Whitaker, a systems engineer with Corporate Software, a PC software products, support and systems integration company based in Norwood, Mass., replies:

Two cards you should look into are ISDNtek's Cyberspace Internet Card and Adax, Inc.'s APC-PCX.

Both are EISA-compatible and support ISDN's Basic Rate Interface. The ISDNtek product supports RS-232-C, and the Adax product supports RS-449 and V.35. Both products support AT&T's 5ESS, but the Adax product also supports Northern Telecom, Inc.'s switches.

Contact Adax at (510) 548-7047 and ISDNtek at (415) 712-3000.

Continued from page 43

While the other network packages are able to connect to any PC running a network protocol stack (in our case, IPX), Remotely Possible requires that the user be logged on to an available server. This makes it difficult for internal help desk people to aid users whose problem is their inability to log on.

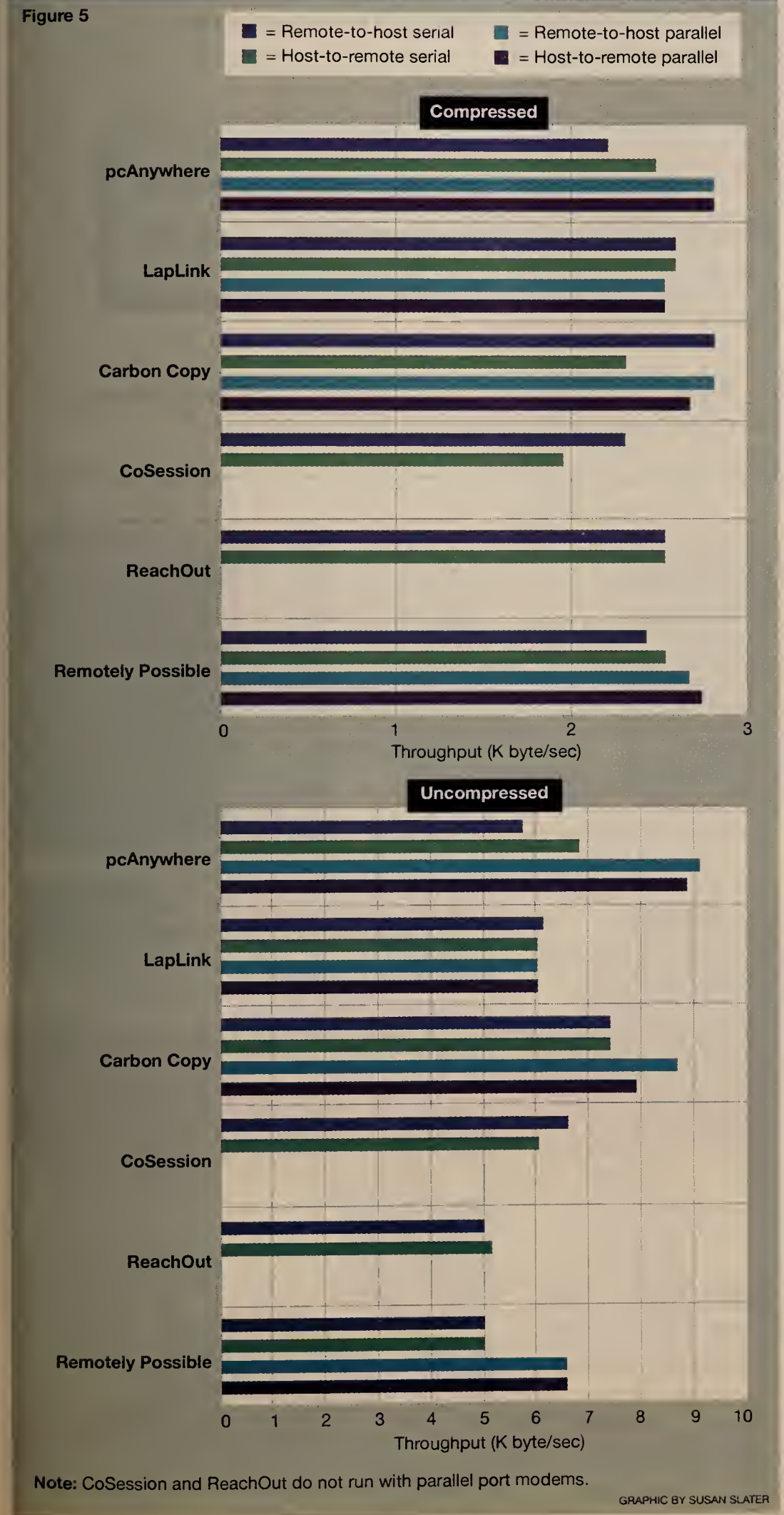
THE BIG PICTURE

We found last week's products, pcAnywhere and LapLink, to be our top choices among remote-access software products. In the second tier lives Carbon Copy and Remotely Possible, two solid choices for remote control that lack some of the features of the first-tier products, such as drive redirection. Of the two, we'd give Carbon Copy the nod for its speedy remote control and file transfer, as well as its enterprise capabilities.

At the bottom of the hierarchy, we'd put CoSession and ReachOut. Poor performance and execution and awkward implementation lead us to decline to recommend these two products, although of the two, CoSession has the edge for those users who need only modem-based remote control, thanks to its drive redirection feature, which we found more useful than ReachOut's unique but proprietary virus checker.

File-transfer performance

Figure 5



Note: CoSession and ReachOut do not run with parallel port modems.

GRAPHIC BY SUSAN SLATER

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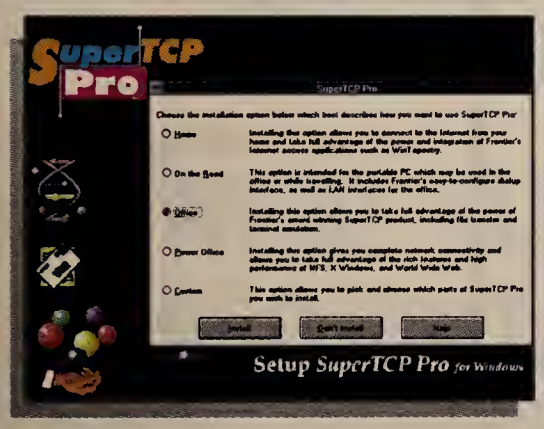

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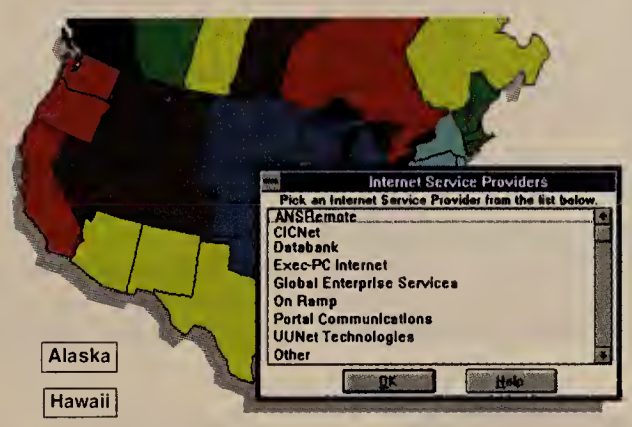

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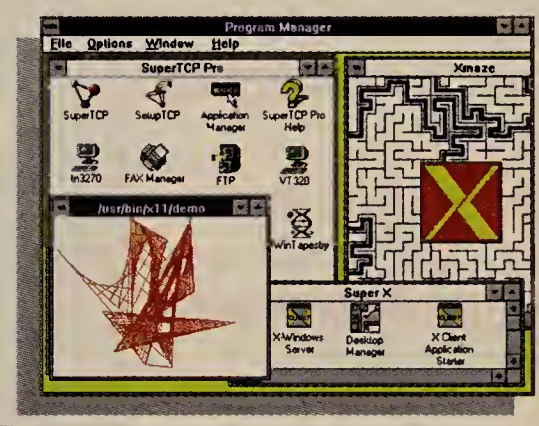

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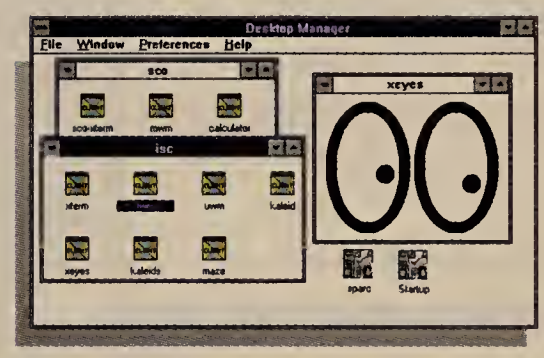

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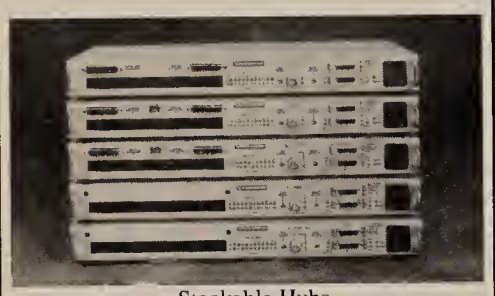

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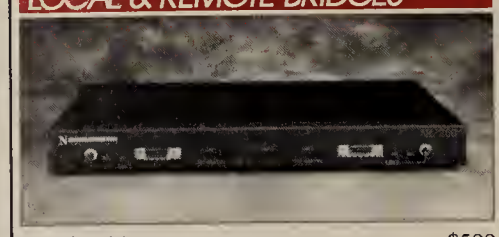

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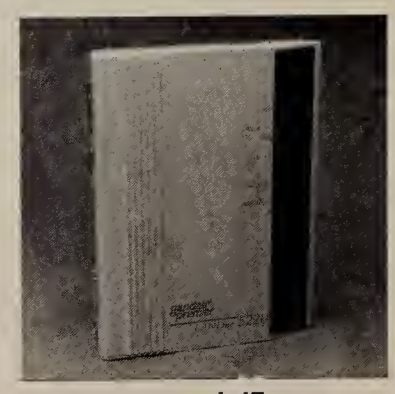

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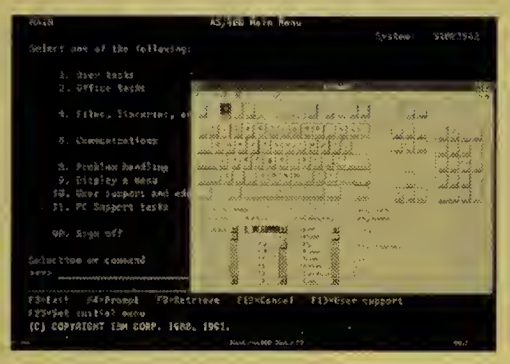
Connectivity - Circle #109



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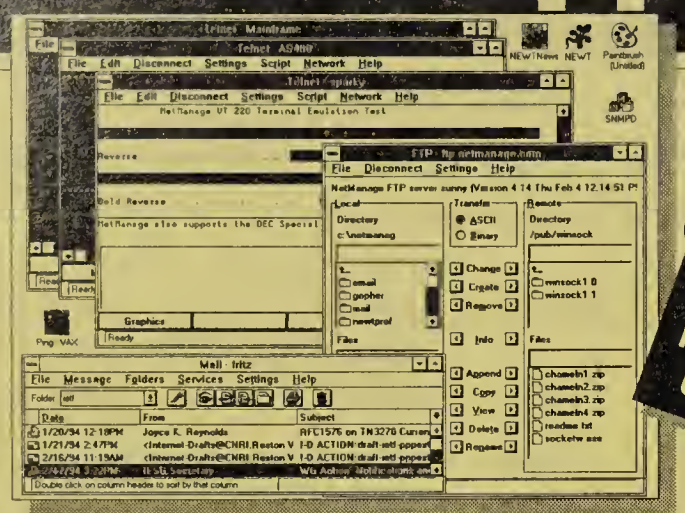
TCP/IP Networking - Circle #111

TCP/IP Applications for Windows



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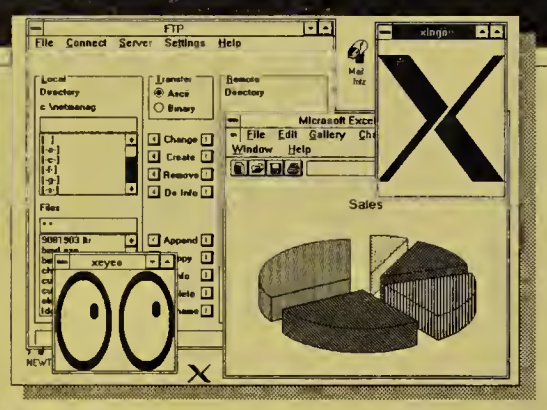
X for Windows



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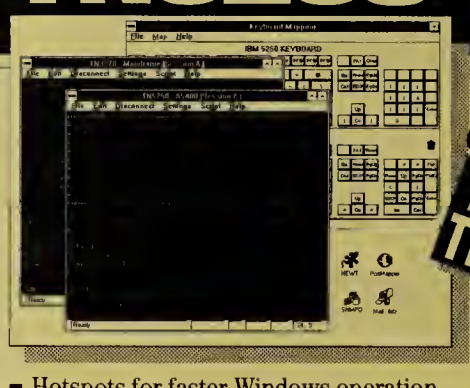
TN3270 TN5250 for Windows



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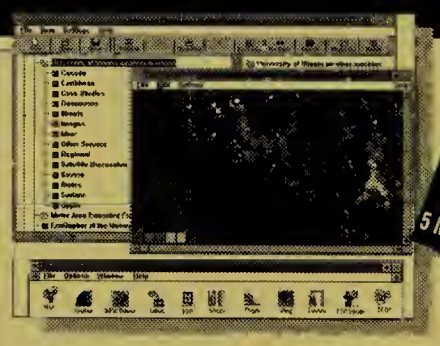

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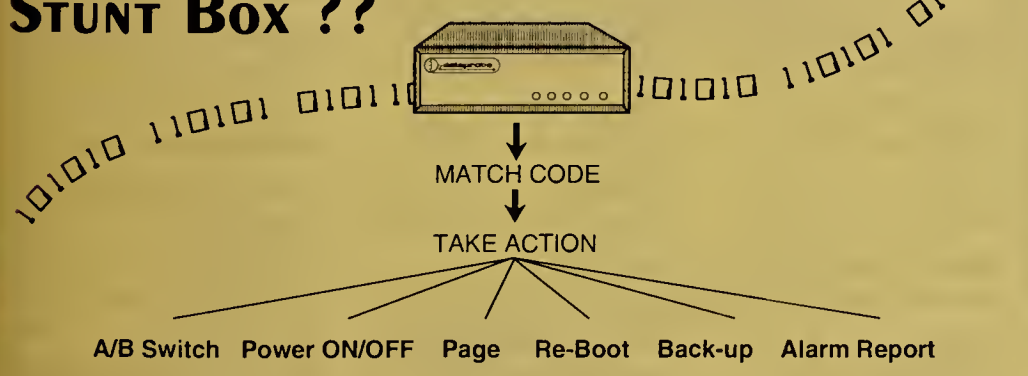

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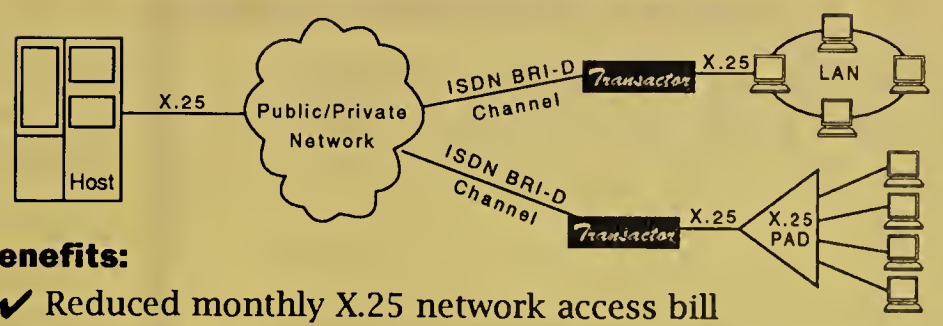

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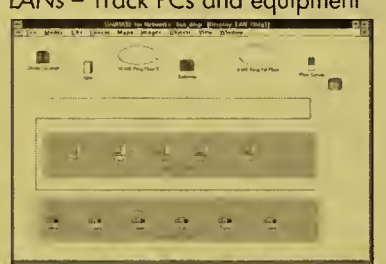

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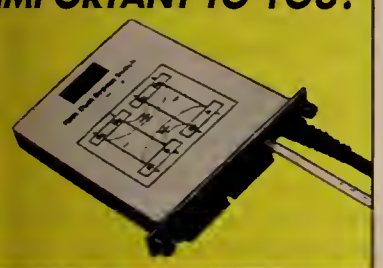

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Client/server

Continued from page 1

sold to another company. Up to that point, Monsanto had handled all of the computing functions for MEMC, which has 14 remote sales and manufacturing facilities worldwide, on IBM mainframes.

After being sold, MEMC hired EDS Corp. to take over the host applications.

Scheduling the production of products to meet customer orders was handled in-house, but MEMC relied on a slow, manual pen-and-paper process.

Because the order processing software was run on machines outside of MEMC's control, the code seemed inflexible and difficult to upgrade from the perspective of MEMC's IS staff. So three years ago, the company began moving the order processing system to newer, easily customizable technology.

At first, MEMC's IS staff thought it might have to rewrite the entire mainframe CICS-based system. Halfway through the project, however, MEMC discovered IBM's RISC System/6000-based CICS/6000 technology and worked with IBM to conduct an application migration strategy, rather than a complicated rewrite.

DIRECTION WITH COMPASS

MEMC calls its client/server-based production planning, scheduling, shipping and tracking suite COMPASS (Customer Order Management Planning Analysis Scheduling Specification). The order processing suite, Customer Resource Management, is identical to the application that used to run on the mainframe. However, MEMC's IS staff is able to maintain and upgrade the program more easily now that it is in-house, Kalbfleisch said.

The client/server system is anchored by a dual Fiber Distributed Data Interface ring linking 500 workstations and 10 of the company's 15 RS/6000 servers at its headquarters here. One of the RS/6000s not on the FDDI ring provides application access to end users at MEMC's remote sites.

The applications run on an Ingres database from Computer Associates International, Inc. and transaction processing software from IBM (CICS/6000) and Transarc Corp. (Encina). The applications are accessible from MEMC-customized graphical user interface-based client applications. According to Kalbfleisch, the system gives end users faster access to applications and the ability to customize their front-end interfaces.

FRIENDLY ADVICE

Despite the project's long time line, the benefits of the new system have made it worth the wait, he said.

But other companies considering such a project should not underestimate the amount of technical expertise needed — some outside assistance will almost surely be required, Kalbfleisch added.

MEMC enlisted the aid of IBM's Open Systems Center in Dallas to put together a prototype client/server network to see if MEMC's goal could be accomplished. The IBM facility is one of 50 such centers worldwide that help users explore interoperability options by integrating computer and network systems from a variety of vendors — aside from IBM.

"We went into [the redesign project] with a goal of solving specific business issues, then we looked for tools to help. We didn't say, 'We're going into client/server,' and try to find a place for it."

Gary Kalbfleisch

Even with design help, moving from a mainframe environment to a Unix system can be a shock, Kalbfleisch said. Unix systems do not have the kinds of administration tools that mainframe operators take for granted, and some mainframe IS people may need to be either retrained or replaced, he added.

Security

Continued from page 8

vices, which adds full datastream encryption and integrity checking to any Oracle-supplied, custom-written or third-party application that works with Oracle7.

Database providers said it is no longer just an issue of keeping database secure within their corporate environment.

More and more companies are looking at giving customers and other companies access to corporate data.

Analysts agreed that database companies must bolster the security features of their products to support Internet-based commerce.

"I don't believe that the database products as they exist today are up for that kind of access," said Tom Berson, president of Anagram Laboratories, Inc. in Palo Alto, Calif., a consultancy specializing in computer security. "They were designed to be used in a relatively closed environment."

Compaq

Continued from page 1

Despite a hiccup on Wall Street last week, the 13-year-old company is flying high. Its overall sales last year increased by a record 51% and Compaq topped all companies by garnering 29% of the worldwide PC-based server market, according to International Data Corp. (IDC), a research firm in Framingham, Mass. Compaq also drew the lion's share (71%) of the multiprocessing server market, according to IDC.

"We will be expanding into data communications — routers, hubs, remote access [devices]. Why can't all those products fit in a Compaq [server]?"

Gary Stimac

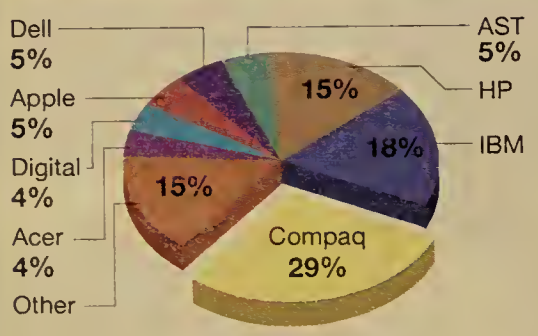
Compaq's server line includes models ranging from the low-end ProSignia families, designed for branch offices and small to midsize businesses, to the high-end, fault-tolerant ProLiant families, designed for mission-critical applications.

The company has prospered in the file-and-print world dominated by Novell, Inc.'s NetWare but sees more of its future growth coming from the high end of the server market — the applications server arena where Compaq is looking to Microsoft Corp.'s Windows NT to lead the way.

While you may not know it, Compaq is already one of the largest manufacturers of network interface cards and modems, which are packaged up with its servers. So the push into new net realms is a natural progression, said Gary Stimac, senior vice president and general manager of Compaq's Systems Division.

Market leader

1994 worldwide PC server market shares



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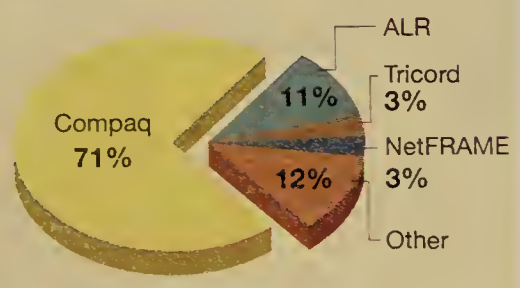

Based on 43,000 units shipped.

GRAPHIC BY SUSAN SLATER SOURCE: IDC, FRAMINGHAM, MASS.

"We recognize that routers and hubs are an integral part of a network, and it makes sense to work with [key] vendors to pool resources," Stimac said.

Stimac and other officials will not say exactly how Compaq will integrate net functions such as hubbing, routing and remote access. The design could be a loose integration of separate components, a stackable component setup — which would be particularly good for remote offices — or building the network pieces right into the servers.

Robert Stearns, Compaq's vice president of corporate development, said the integration would simplify management and give customers the same level of control over network equipment that they have with servers through Insight Manager.

Jay Batson, a senior analyst with Forrester Research, Inc. in Cambridge, Mass., said a server outfitted with networking capabilities would be attractive to a company that wants to preconfigure everything and ship it out to remote offices.

James Scott, senior network technical analyst at Mercy Health Plan in Lester, Pa., agreed. "It might make sense because in the remote offices, we usually have a significant space limitation," said Scott, whose network includes seven Compaq servers.

Compaq is mum on what network pieces it will build and what it will get through partnerships with other suppliers, but officials emphasize that partnerships will play an important role in the effort.

Ease of use and manageability might persuade a user to buy a router/server combination from Compaq, said Lee Doyle, an IDC analyst. But he questioned whether Compaq could handle the ease-of-use part of the equation. "Have you ever tried to configure 50 routers?" he asked.

Chris Goodhue, an analyst with Gartner Group, Inc., a Stamford, Conn., research firm, said most large firms have sophisticated nets and do not need or want combined servers and routers. "I'm not sure that it is the smartest thing for Compaq to do," he said.

" 'Superserver' is an obsolete, useless term born out of the NetFRAME class of machine."

Mike Perez

Many users also prefer to choose equipment from best-of-breed products, said Brad Baldwin, a principal with Baldwin Network Research in Fremont, Calif.

Forrester's Batson said Compaq's strategy also will place greater strains on its service infrastructure, noting that problems will be difficult to pin down in a server/hub/router configuration.

INCREASED INSIGHT

To help users on that front, Compaq will beef up its Insight Manager to provide additional net management capabilities. The Windows-based server management program eventually will evolve into a lights-out package that could handle automated backup and software distribution, Stimac said.

Insight Manager will also support the Desktop Management Interface (DMI) specifications. The DMI is a standard being developed by the Desktop Management Task Force to ease PC management.

SmartStart, Compaq's CD-ROM installation tool, will also see improvements, said Mike Perez, vice president of engineering for Compaq's Systems Division. Products such as UnixWare not already on a SmartStart CD-ROM may be added this year.

According to Gartner's Goodhue, high-end PC-based application servers will see the most growth and provide the highest margins next year because they present a cost-attractive opportunity for customers. In that market, Compaq will be facing some tough challengers such as Hewlett-Packard Co.

Compaq's strategy is to stay ahead of its competition — offering innovations such as rack-mounting of servers and Insight Manager. In the application server arena, one key innovation for Compaq is clustering.

Clustering lets users share tasks and data. It can be done several ways — through software and the operating system, or via hardware — and Compaq will explore a variety of approaches, Perez said. One thing Compaq will not do, because of technical concerns, is offer more than four processors in a single box.

"Clustering is the way to go if you need more," Perez said.

↬ Staff Writer Jodi Cohen contributed to this story.

NetView

Continued from page 1

will be possible to distribute the system database to other computers. The platform currently supports IBM's DB/6000 as well as Informix Software, Inc., Oracle Corp., Ingres and Sybase, Inc. databases. Today, most NetView for AIX customers use a single workstation to perform all management functions.

"Running the management database on the same platform [with the rest of the management platform functions] can cause it to run out of steam, especially in large environments," said John McConnell, president of McConnell Consulting, Inc. in Boulder, Colo.

By off-loading the database, the management system can run faster and be scaled up to handle larger nets, McConnell said. Ultimately, users could have multiple database servers on different, more economical computing platforms, such as Windows, and incorporate them into a central NetView for AIX platform.

Adding support for SNMPv2 will also improve NetView's scalability, enabling distributed NetView for AIX managers to share data.

For example, SNMPv2 will let one NetView platform act as a backup to another, so if the primary manager fails, another can automatically take over. IBM has a backup program for NetView today, but it is not standards-based.

Also, support for SNMPv2 will enable one NetView platform to freely send or share management data with another NetView platform. None of these capabilities were possible with SNMPv1.

"SNMPv1 did not make provisions for managers to easily communicate with other managers because it was set up to communicate only with agents," Huntington-Lee said. "In large environments, it's crucial for multiple managers to exchange data freely."

What's new with NetView for AIX?

- Support for distributed databases
- Compliance with SNMPv2
- Improved security features
- Additional event correlation and synchronization capabilities
- Better manager-to-manager capabilities
- Faster discovery of net resources

Also included in SNMPv2 are new security features that will let NetView for AIX operators control access to management information. IBM also will add user authentication features to the platform.

"SNMPv1 doesn't really have any security provisions, which is a real detriment in large networks," said Michael Emanual, vice president of marketing for Network Managers, Inc., a network management software development company in Chelmsford, Mass.

Analysts also said it was important for IBM to support SNMPv2 since most of the major router vendors have or will be deploying it in the coming months.

"Some of the router vendors were waiting for the net management platform vendors to support SNMPv2 before they put it in their products, so this could be the big event that triggers SNMPv2 rollouts," Huntington-Lee said.

MR. SPEEDY

Other improvements in NetView for AIX 3.2 include a speedier discovery feature as well as event and alarm correlation capabilities.

According to Ellis Gregory, president of NetTech, Inc., a network management software development firm in Raleigh, N.C., the new discovery feature picks up on new devices and resources in less than half the time of the existing product.

The new software additionally lets users present events or alarms on one integrated window.

Today, the NetView screen can integrate alerts from different resources but they all appear in different windows on the screen.

NetView will now let users integrate events on one screen, thereby simplifying the task of monitoring multiple events.

Pricing was unavailable, and IBM declined to comment on the enhancements.

Group

Continued from page 4

rights.

Corrigan, who is also president of software developer Ki Networks, Inc., drafted a response to the vendor letter last week, reiterating MIC's objective to be a working forum focused on producing software code, not a standards group. He said MIC has heard and acted on vendor criticism of the "perceived image" of the group and that individual companies will take ownership of products written to MIC specifications.

Corrigan said MIC plans to continue operations. But analysts said the vendors' actions may have unfortunate consequences for MIC and its goals.

"It means users are less likely to pu faith in what MIC is doing," said Jil Huntington-Lee, principal analyst a Brandywine Network Associates i Cinnaminson, N.J. "But no one else i going to solve this problem in a timel fashion."

Huntington-Lee said the vendors reasons for pulling out of MIC "seer rather weak and not entirely credible."

According to John McConnell president of McConnell Consulting Inc. in Boulder, Colo., the vendors withdrawal will slow the effort to unif the network management industr around consensus on an open dat repository.

"The people that are left holding th bag are the users," he said.

Notes

Continued from page 1

Microsoft's Exchange messaging line is due to roll out with a mail client in the Windows 95 operating system, which was recently delayed until this fall. Microsoft has not announced when it will ship the Exchange server, which will require the next-generation Windows NT server operating system, dubbed Cairo.

POSITIVE FEEDBACK

Users applauded Lotus' decision to cut the volume price of Notes from $330 to $275 per copy and to release a less expensive run-time client, named Notes Desktop.

Notes Desktop, which can run all Notes applications, should make it easier and less expensive for companies to deploy Notes across an enterprise. Given that Notes is increasingly bought in quantities of several thousand, the run-time version could save large users thousands of dollars up front.

Changing times

Lotus last week said that during the fourth quarter, its communications products – mainly Notes and cc:Mail – for the first time generated more revenue than traditional desktop applications.

"It puts [Notes] in the same [pricing] ballpark as a word processor," said Greg Davis, coordinator of office systems for Maytag in Newton, Iowa.

Many users said Notes Desktop is what they had hoped for in Notes Express, released last fall. But it was limited to five simple template applications and could not run applications designed for other Notes clients.

"We've been telling them [to release a run-time version] for many years now," said John Whalen, manager of offices systems for Health Canada, a federal department in Ottawa. He added that Notes Express was a flawed product because a key point of Notes was to let employees share information – something they could not do if all the applications would not work with it.

"We'll try to convert all our Notes Express licenses to the run-time version," said John Stiles, a groupware product manager for Denver-based US WEST Technologies, Inc., which is building a 45,000-user Notes network.

Also important to users is the ability they will get to easily roll out simplified Notes clients to people who do not need or want the complex development and menu tools included in the full-blown Notes client. Larry Quinlan, manager of network services for Deloitte & Touche, LLPin Hermitage, Tenn., said this will make life easier on both end users and the MIS staff they now call for help.

"Thousands of end users do not require the [application] design capability. Why do they need all those menus?" he asked. Deloitte & Touche has 7,200 Notes users and some 120 OS/2-based Notes servers worldwide – a number Quinlan expects will grow a lot.

NOTES MANAGEMENT

Users were as enthusiastic about NotesView, a network monitoring tool due to start shipping next month. The tool uses a graphical interface to let users view the health of Notes servers, network links and replication processes. The initial release requires Hewlett-Packard Co.'s HP OpenView for Windows; Lotus said it is talking to other management vendors, as well. Each console can monitor as many as 150 servers.

NotesView will come with Simple Network Management Protocol agents for OS/2-, Windows NT- and NetWare-based Notes servers initially, with agents for Unix and Windows platforms to ship midyear. Lotus expects to release a NotesView API midyear, as well.

Lotus Vice President Michael Zisman said NotesView could reduce management costs by making it far easier to oversee large and complex Notes networks.

Vincent Vecchia, a vice president for computer technology at Citibank, N.A. in New York, said he is looking forward to taking a close look at the software. Currently, the bank does a considerable amount of its management manually by logging on to Notes servers across its network and looking around. But that cannot begin to provide the sort of statistics needed to diagnose impending trouble spots, let alone provide instant alerts to problems, he said.

Pricing will start at $3,500 for a license that covers as many as 10 servers; an unlimited enterprise license will cost $6,000.

✆Lotus: (617) 577-8500.

Lotus to link Notes to the world

Lotus Development Corp. last week gave the first public showing of Version 4.0 of Lotus Notes, in a demonstration that highlighted performance and interface enhancements.

Version 4.0, due to ship early in the second half of the year, will boast the ability to replicate only changed fields within a document rather than the entire document. Replicating entire documents can cause significant server and net performance hits if the document includes large multimedia objects.

The new version gains support for Microsoft Corp.'s OLE 2.0, both on the client and across the network for launching remote applications, and will add support for Apple Computer, Inc.'s Power Mac client and for Microsoft's Messaging Application Programming Interface.

End users get a new interface that includes a preview window for documents and an integrated World-Wide Web client.

Mobile users will gain the ability to link to any server with a single dial-up connection into a Notes network.

Lotus and AT&T said they are working on software to connect Notes with AT&T's Intuity multimedia switch via extensions to the X.400 Application Program Interface Association's Common Messaging Calls API. This would let Notes users listen to voice mail via their Notes mailboxes or have their electronic mail read to them when they call in for their voice mail.

The software is due to roll out in the second half of the year. Pricing was not announced.

In other news, Lotus and Motorola, Inc. said they are working to develop wireless cc:Mail and Notes clients that will be able to run across cellular nets.

Separately, Lotus announced tools for connecting Notes to the Internet. InterNotes Web Publisher, which will turn Notes databases into their Web equivalents, will ship by midyear at prices starting at $7,500 per server.

Lotus said it is working on software that will let cc:Mail users connect to their post offices by way of the Web. No pricing or availability was announced.

Also last week, CompuServe said it was extending its existing Notes messsaging hub to give Notes users access to Usenet conferences and Internet mailing lists for $18 per hour.

Wolf Communications Co. of Houston said Notes users will be able to replicate databases to its WorldCom service for conversion into Web databases. The service, which includes space on a WorldCom server, starts at $2,000 to set up and $200 a month to maintain.

BY ADAM GAFFIN

NYNEX

Continued from page 4

negotiating power" for local phone rates, said Thomas McCarthy, CMA president and telecommunications director for New York City public schools.

NYNEX hopes the agreement will demonstrate to state and federal regulators that they should lift the cap on the carrier's profits and also let it compete in the long-distance market.

MFS regards the agreement as a short-term solution while it waits for the New York State Public Services Commission to set final interconnection rules sometime this spring.

Ryan James, a telecommunications analyst with The Yankee Group in Boston, said the agreement could have implications beyond New York. Regulators in Arizona, California, Connecticut, Delaware, Maryland, Michigan, New Jersey, Ohio, Oregon, Pennsylvania, Washington and Wisconsin are weighing how to regulate open local-access markets.

In fact, the Illinois Commerce Commission is considering staff recommendations made last week to reject Ameritech's proposal that the local market only be opened if Ameritech is allowed to enter the long-distance market.

ATM switch

Continued from page 6

at Arinc Research Corp., which is purchasing two of GDC's new MAC1s as the prime contractor for the U.S. Army's Interoperability Network.

"The MAC1 shares all the same features and uses the same cards as the [GDC] Apex DV2s we've already installed. And it's tied directly into the same management platform, which is important to us," Keller said.

The GDC and Cascade products serve different roles.

Cascade's B-STDX 8000 is a smaller version of the B-STDX 9000, a multiservice WAN switch that supports frame relay, Switched Multimegabit Data Service and ATM switching. Cascade is focused mainly on data transport and the ability to support a combination of different services. The 9000 has 16 slots, while the 8000 has eight, but both have a capacity of 1.2G bit/sec.

The 8000 uses the same cards as the 9000, including the eight-port T-1 ATM switching card that Cascade announced late last year. The 8000, priced from $15,000, supports a maximum of 48 T-1 ATM lines or up to 60 frame relay T-1s.

GDC's Apex MAC1 is the smallest member of its Apex ATM switch family. It has five slots, while a larger model – the Apex MAC – was unveiled six months ago with eight slots. Both are simply downsized versions of the 16-slot Apex enterprise/carrier switch, with a focus on mixing data, voice and video over ATM nets.

All Apex versions also share the same cards, giving the MAC1 a capacity of eight T-1 ATM or frame relay ports. Its base price is $6,000.

GDC also announced that it has integrated frame relay switching on the Apex along with support for the new Frame User Network Interface (FUNI). GDC is the first vendor to support FUNI, which is an enhanced version of the ATM Data Exchange Interface (DXI).

DXI and FUNI let standard routers and other non-ATM equipment be connected to an ATM device without first upgrading them with an ATM interface. DXI simply tweaks standard data frames into a format that ATM gear can more easily convert into cells, and FUNI adds some enhanced signaling. Its chief benefit is in low-speed interworking with ATM, such as feeding an ATM backbone using 56K bit/sec lines.

✆Cascade: (508) 692-2600; GDC: (203) 574-1118.

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Back to Reality

Bart Simpson hails new IRS database; ARPA promises relief from data crackers.

BY DAVID J. BUERGER

I was touched last week watching President Clinton's effort to renew my faith in government during his State of the Union speech.

But I snapped back to reality by sipping a fine glass of Macallan scotch and recalling P.J. O'Rourke's wisdom: "Feeling good about government is like looking on the bright side of any catastrophe. When you quit looking on the bright side, the catastrophe is still there."

CEOs in recovery mode often rely on cost cuts. Clinton prefers revenue enhancements. A new Internal Revenue Service technology plan recently published in the *Federal Register* will end up collecting a lot more than cash in the Treasury Department's coffers.

The IRS plan is called Compliance 2000. Essentially, this will be a superdatabase to monitor taxpayer compliance. Picture it as a one-stop home page for IRS agents that's accessed through automated LANs.

This mother of all databases will contain more than your tax records. Third-party contributions will come from federal government databases; commercial databases; state motor vehicle departments; credit bureaus; state and local real estate records; commercial publications; newspapers; and other state and local records.

No wonder the government is such a big buyer of ATM gear! What else could push this info load from desktop to desktop?

At least the networking industry is making the IRS' life easier by pushing cybercash and electronic commerce. Rekeying data is the pits.

You will be pleased to know this repository will be exempt from notification, access and contest provisions of the Privacy Act of 1974.

That means you cannot see or demand changes to anything in the database. And we're all familiar with the accuracy of our credit reports.

Information will be accessed by entering your Social Security number. Sounds like pretty good privacy to me — not.

I asked several experts to comment on the IRS plan. The only one who would dare say anything on the record was Bart Simpson, and they won't let me print what he thought of it.

Use http://www.epic.org in /cpsr/privacy/epic/irs_compliance_2000_notice_txt to read a copy of the IRS notice on the Electronic Privacy Information Center's home page.

You might also give Compliance 2000 executive Larry Faulkner a call at (202) 622-6900 and ask him how the plan — scheduled to start today — will comply with the Privacy Act's intent to limit, not expand, access to personal data by government agencies.

Hey, don't have a cow, man. IRS employees never snoop without a good reason.

Leaky dike

You Internauts should feel right at home with this chat about security. Nary a week goes by without word about someone's network being pierced by an intruder. Private networks are starting to look like Holland, battered by a sea of "netlaws" doing their damnedest to unplug the dike.

Security experts last week admitted that they could be losing the war against digital peepers. Thank God the government is about to step in and save the day.

Our savior is the agency that created the Internet, the Advanced Research Projects Agency (ARPA). Its Contracts Management Office just released a request for proposal that will finally make the net a safe place for our fingers to walk.

The proposal seeks advanced security technologies for the Defense and National Information Infrastructures. The Defense Department isn't stupid. It plans to run its network in parallel with, not as part of, Al Gore's superhighway.

ARPA said the solicitation is "part of a larger strategy for developing technology for defensive information warfare." I'm not sure what that means, but it sounds like something we citizens could use against the IRS database.

Wiring woes?

Category 5 unshielded twisted-pair wire has been the media of choice for users planning fast LANs, especially for multimedia applications.

But a shortage of fluorinated ethylene propylene (FEP), the chemical used to insulate Category 5, is starting to pinch supply. Street prices have risen about 30% during the past six months. Du Pont, which supplies about 70% of the Category 5 market, says gross is running about 50% a year.

As the biggest maker of FEP, the company is sinking $150 million into new production capacity but admits that until early 1997, this won't help to boost the supply.

Meanwhile, cable resellers are starting to push multimode optical fiber to the desktop as an alternative.

Will users bite? Fiber proponents say yes, citing equivalent lifetime costs for a fiber vs. Category 5 LAN.

When Johnny Carson announced there was a toilet paper "shortage" in the '70s, people stocked up, causing a shortage. I don't expect similar results with Category 5, but this might be a good time to consider options.

Buerger is an Atlanta-based industry consultant and contributing editor to *Network World*. He can be reached at (404) 495-7494 or at dbuerger@pipeline.com.

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CyberSpeak

Voices from the reader network

What are your biggest network product service and support concerns?

◆ "Things are changing so rapidly that we get new things in and nobody knows how to work on them. The big problem we have is you can't find anyone who can help you with support, or when you do, they're so busy they can't get back with you — especially in a multivendor environment. Nobody wants to take responsibility."

Robin Franklin, networking director, Mississippi Department of Finance and Administration, Jackson

◆ "Net monitoring and being able to extract information from it. Every piece of equipment has its own flavor, so you almost have to buy that manufacturer's monitoring station. I just want to make it easier so you can monitor everything from one station."

Tim Blackburn, technical support, Stepan Co., Northfield, Ill.

◆ "The speed and cost of remote connections. There is no valid solution as far as speed across phone lines like you need to connect with your net. When you go to shift the kind of data we do across a phone line, you're forever waiting for your screen to update. You try to go with T-1, then you're on a month-to-month payment of $400. So at the end of the year, you've almost paid for two PCs. Also, companies can't afford the kind of labor it takes to support a network."

Rick McArthur, net analyst, Mother Francis Hospital, Tyler, Texas

NextWeek
CyberSpeak Out!

Some industry observers say that the lack of security on the Internet makes it unsuitable for electronic commerce. What do you think?

Responses due by 8 p.m. Thursday, Feb. 2. You'll get a T-shirt if we print your response. Please include your name, company and address.

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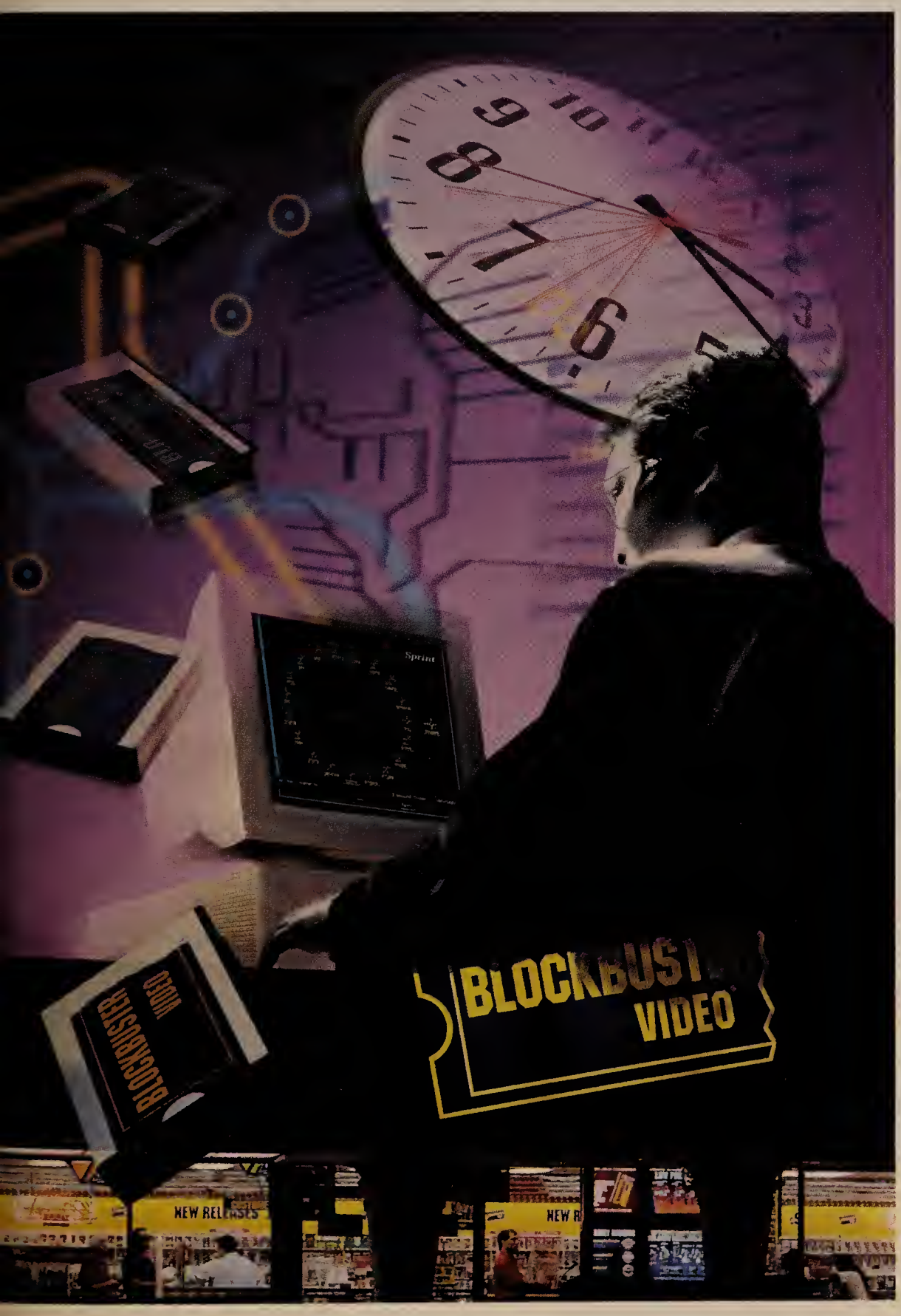

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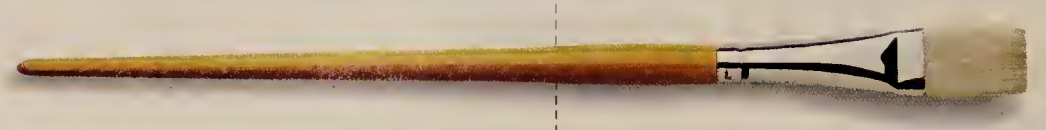

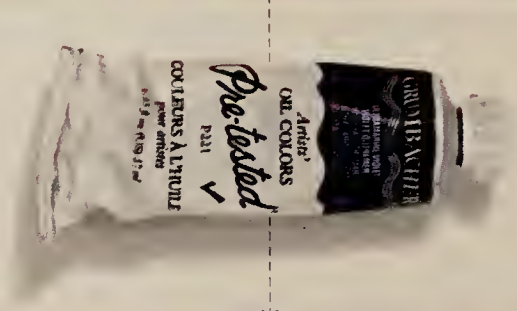

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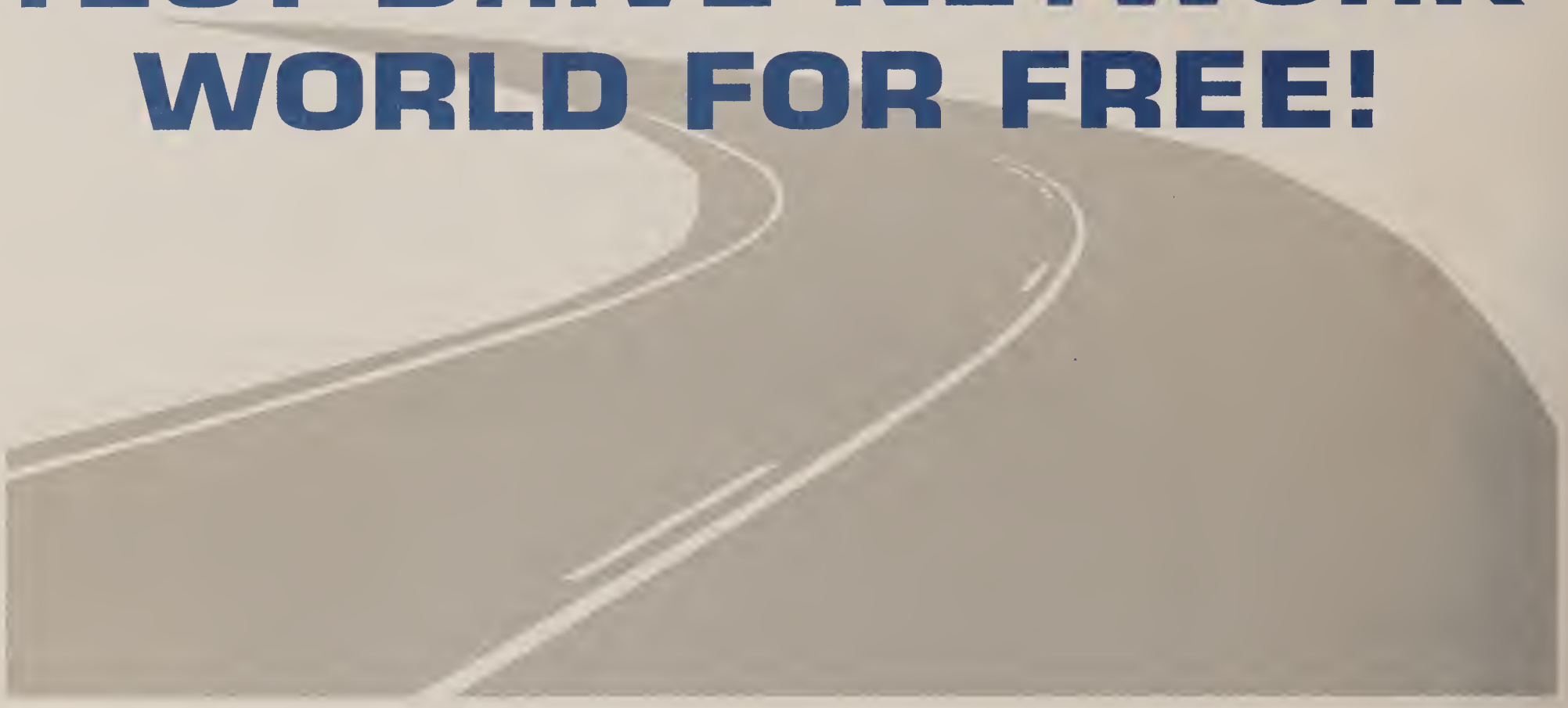

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1 Industry: (check one only)

01. ☐ Manufacturers (other)
02. ☐ Finance/Banking
03. ☐ Insurance/Real Estate/Legal
04. ☐ Healthcare Services
05. ☐ Hospitality/Entertainment/Recreation
06. ☐ Media/TV/Cable/Radio/Print
07. ☐ Retail/Wholesale Trade/Business Services
08. ☐ Transportation
09. ☐ Utilities
10. ☐ Education
11. ☐ Process Industries (Mining/Construction/ Petroleum Refining/Agriculture/Forestry)
12. ☐ Government Federal/State/Local
13. ☐ Military
14. ☐ Aerospace
15. ☐ Consultants (Independent)
16. ☐ Carriers/Interconnects
17. ☐ Manufacturers (Computer/Communications)
18. ☐ Systems/Network Integrators (VAR/VAD/ VAN/Systems/Software Houses)
19. ☐ Distributors Communications/Computers
20. ☐ Other_____

2 What is your Job Function? (check one only)

NETWORK IS Management:

. ☐ Networking Management
. ☐ LAN Management
. ☐ Datacom/Telecom Management
. ☐ IS,IT,MIS,Systems Management
. ☐ Engineering Management
. ☐ Corporate Management (CIO,CEO,PRES,VP, DIR,MGR,Financial Management)
. ☐ Consultant (Independent)
. ☐ Other_____

3 What is the total number of sites for which you have purchase influence? (check one only)

. ☐ 100+
. ☐ 50 - 99
. ☐ 20 - 49
. ☐ 10 - 19
5. ☐ 2 - 9
6. ☐ 1
7. ☐ None

4 What is your scope and involvement in purchasing decisions for network products & services for your enterprise?

A. SCOPE (check one only)

☐ Corporatewide
☐ Multienterprise
☐ Departmental
☐ None

B. INVOLVEMENT (check all that apply)

1 ☐ Recommend/Specify
2. ☐ Approve
3. ☐ Evaluate
4 ☐ Determine the need
5. ☐ None

5 Check ALL that apply in columns A and B:

A: I am involved in the purchase of the following products/services.
B: I plan to purchase the following products/services.

A	B	
☐ 100	☐	**LOCAL AREA NETWORKS**
☐ 01.	☐	Local Area Networks
☐ 02.	☐	Network Operating Systems Software (NOS)
☐ 03.	☐	LAN Storage Devices (optical, tape, disk, etc.)
☐ 04.	☐	LAN Backup Systems (optical, tape, disk, etc.)
☐ 05.	☐	Network Test Equipment/Diagnostic/ Management Software
☐ 06.	☐	Hubs/Intelligent Hubs
☐ 07.	☐	Cables, Connectors, Baluns
☐ 08.	☐	UPS
☐ 09.	☐	Network Adapter Boards/Network Interface Cards
☐ 10.	☐	Peer-to-Peer LANs
☐ 11.	☐	Wireless Networks
☐ 12.	☐	SNMP Network Management
☐ 13.	☐	ATM Switches
☐ 14	☐	Remote LAN Access
☐ 15.	☐	Ethernet Switches
☐ 16.	☐	LAN Servers
☐ 17.	☐	Superservers
☐ 18.	☐	Remote Access/Communications Servers
☐ 101	☐	**REMOTE/WIRELESS COMPUTING**
☐ 19.	☐	Laptops
☐ 20.	☐	Notebooks
☐ 21.	☐	PDAs
☐ 22.	☐	PCMCIA
☐ 23.	☐	Mobile Data Services
☐ 24.	☐	Wireless Data Services
☐ 25.	☐	Wireless Data Equipment
☐ 102	☐	**INTERNETWORKING**
☐ 26.	☐	Bridges
☐ 27.	☐	Routers
☐ 28.	☐	Gateways
☐ 29.	☐	Bridge/Routers
☐ 103	☐	**COMPUTERS/PERIPHERALS**
☐ 30.	☐	Micros/PCs
☐ 31.	☐	Minis
☐ 32.	☐	Mainframes
☐ 33.	☐	Workstations
☐ 34	☐	Front-End Processors
☐ 35.	☐	Terminals
☐ 36.	☐	Printers
☐ 37.	☐	Cluster Controllers
☐ 38.	☐	Fax Machines
☐ 39.	☐	Monitors
☐ 104	☐	**SOFTWARE/APPLICATIONS**
☐ 40.	☐	Network Management
☐ 41.	☐	Systems Management
☐ 42.	☐	Micro to Mainframe
☐ 43.	☐	Security
☐ 44.	☐	Communication/Terminal Emulation
☐ 45.	☐	Word Processing
☐ 46.	☐	Operating Systems
☐ 47.	☐	Client Server Applications Development
☐ 48.	☐	Applications Development
☐ 49.	☐	Data Base Management/RDBMS
☐ 50.	☐	Spreadsheet
☐ 51	☐	Groupware
☐ 52.	☐	EDI
☐ 53.	☐	E-Mail
☐ 54	☐	Windows/Graphical User Interface
☐ 55.	☐	4GL Development/Case
☐ 56.	☐	Multimedia
☐ 57	☐	Graphics/DTP
☐	☐	**SOFTWARE/APPLICATIONS (cont'd)**
☐ 58.	☐	Remote Access
☐ 59.	☐	Imaging
☐ 60.	☐	Suites
☐ 61.	☐	Middleware
☐ 62.	☐	Document Management
☐ 105	☐	**WIDE AREA NETWORKS EQUIPMENT & SERVICES**
☐ 63.	☐	Modems (9.6K bps and over)
☐ 64.	☐	Modems (under 9.6K bps)
☐ 65.	☐	T-1/T-3 Multiplexers
☐ 66.	☐	T-1/T-3 Services
☐ 67.	☐	Inverse Multiplexers
☐ 68.	☐	Fractional T-1
☐ 69.	☐	SMDS
☐ 70.	☐	ATM (Asynchronous Transfer Mode)
☐ 71.	☐	Matrix Switches
☐ 72.	☐	Packet Switches
☐ 73.	☐	Protocol Converters
☐ 74.	☐	Diagnostic/Test Equipment
☐ 75.	☐	DSU/CSU
☐ 76.	☐	Microwave
☐ 77.	☐	Fax Boards/Modems
☐ 78.	☐	VSAT
☐ 79.	☐	Fiber Optic
☐ 80.	☐	Satellite
☐ 81.	☐	ISDN
☐ 82.	☐	PBXs (over 1000 lines)
☐ 83.	☐	PBXs (under 1000 lines)
☐ 84.	☐	Automatic Call Distributors
☐ 85.	☐	Voice Messaging Systems
☐ 86.	☐	Videoconferencing/Teleconferencing
☐ 87.	☐	Voice Response/Processing
☐ 88.	☐	Dedicated Leased Line
☐ 89.	☐	Switched Data
☐ 90.	☐	E-Mail/Online Services
☐ 91.	☐	Image Processing
☐ 92.	☐	800/900 Services
☐ 93.	☐	WATS/MTS
☐ 94.	☐	International
☐ 95.	☐	Virtual Networks
☐ 96.	☐	Frame Relay
☐ 97.	☐	Value Added Services
☐ 98.	☐	CIT (Computer-Integrated Telephony)
☐ 99.	☐	None of the above (1-98)

6 What is the total number of LANS, Workstations/Nodes: At this Location/ in your Organization?

At This Location:

	LANs		Workstations/ Nodes
1.	☐	5000+	☐
2.	☐	1,000 - 4,999	☐
3.	☐	100 - 999	☐
4.	☐	50 - 99	☐
5.	☐	10 - 49	☐
6.	☐	9 or less	☐
7.	☐	None of the above	☐

Entire Organization:

	LANs		Workstations/ Nodes
1.	☐	5000+	☐
2.	☐	1,000 - 4,999	☐
3.	☐	100 - 999	☐
4	☐	50 - 99	☐
5.	☐	10 - 49	☐
6.	☐	9 or less	☐
7.	☐	None of the above	☐

7 Check ALL that apply in columns A and B:

A: The following network platforms are currently installed.
B: The following network platforms are currently planned.

A	B	
☐ 55	☐	**NETWORK ARCHITECTURES**
☐ 01.	☐	SNA
☐ 02.	☐	DECNET
☐ 03.	☐	MAP/TOP
☐ 04.	☐	TCP/IP
☐ 05.	☐	DCA (Unisys)
☐ 06.	☐	X.25
☐ 07.	☐	Novell IPX/SPX
☐ 08.	☐	APPC/APPN/LU6.2
☐ 09.	☐	NETBIOS
☐ 10.	☐	OSI
☐ 11.	☐	APPLETALK
☐ 12.	☐	NSF
☐ 13.	☐	XNS
☐ 14.	☐	OTHER_____
☐ 56	☐	**NETWORK OPERATING SYSTEM**
☐ 15.	☐	LOCALTALK (APPLETALK)
☐ 16	☐	BANYAN (VINES)
☐ 17.	☐	DCA (IRMALAN)
☐ 18.	☐	DCA (10-NET)
☐ 19.	☐	IBM (LAN SERVER)
☐ 20.	☐	IBM (PC LAN PROGRAM)
☐ 21.	☐	MICROSOFT (LAN MANAGER)
☐ 22.	☐	NOVELL (NETWARE, 2X, 3X, 4X)
☐ 23.	☐	PROTEON (PRONET)
☐ 24.	☐	3COM (3+, 3+OPEN)
☐ 25.	☐	ARTISOFT (LANTASTIC)
☐ 26.	☐	HAYES (LANSTEP)
☐ 27.	☐	DEC (PATHWORKS)
☐ 28.	☐	WINDOWS NT/ADVANCED SERVER
☐ 29.	☐	OTHER_____
☐ 57	☐	**LAN ENVIRONMENT**
☐ 30.	☐	4M TOKEN RING
☐ 31.	☐	16M TOKEN RING
☐ 32.	☐	ARCNET
☐ 33.	☐	ETHERNET
☐ 34.	☐	100 M ETHERNET
☐ 35.	☐	STARLAN
☐ 36.	☐	FDDI
☐ 37.	☐	LOCAL TALK
☐ 38.	☐	10BASE-T
☐ 39.	☐	ATM
☐ 40.	☐	OTHER_____
☐ 58	☐	**COMPUTER OPERATING SYSTEM**
☐ 41.	☐	DOS
☐ 42.	☐	UNIX/XENIX/AIX
☐ 43.	☐	OS/2
☐ 44.	☐	OS/2.X
☐ 45.	☐	IBM MVS
☐ 46.	☐	IBM VM
☐ 47.	☐	DIGITAL VMS
☐ 48.	☐	MACINTOSH
☐ 49.	☐	WINDOWS
☐ 50.	☐	WINDOWS NT
☐ 51.	☐	X WINDOWS
☐ 52.	☐	SOLARIS
☐ 53.	☐	OTHER_____
☐ 54.	☐	None of the above (1-53)

8 For which areas outside of the U.S. do you have purchase influence? (check all that apply)

1. ☐ Europe
2. ☐ Asia
3. ☐ South America
4 ☐ Australia
5. ☐ Middle East
6. ☐ None

9 Which of the following hardware platforms are installed/planned in your company? (check all that apply)

	Mainframes		Minis	
	Installed	Planned	Installed	Planned
01. IBM	☐	☐	☐	☐
02. DIGITAL	☐	☐	☐	☐
03. AMDAHL	☐	☐	☐	☐
04. AT&T	☐	☐	☐	☐
05. BULL HNIS	☐	☐	☐	☐
06. DATA GENERAL	☐	☐	☐	☐
07. HP	☐	☐	☐	☐
08. TANDEM	☐	☐	☐	☐
09. UNISYS	☐	☐	☐	☐
10. OTHER_____	☐	☐	☐	☐

Which of the following do you have installed/planned:
(USE NUMBERS ONLY)

	At This Location		Entire Organization	
	Servers	Clients/ Nodes	Servers	Clients/ Nodes
11. POWER MACINTOSH				
12. MACINTOSH OTHER				
13. POWER PC BASED				
14. PENTIUM BASED				
15. 80486 BASED				
16. 80386 BASED				
17. 80286 BASED				
18. 80806/80808 BASED				
19. ALPHA BASED				
20. RISC/UNIX BASED WORKSTATIONS				
21. OTHER				

10 What is the estimated value of networking equipment and services that you help specify, recommend or approve annually? (check one only)

01. ☐ $100 million and over
02. ☐ $50 - $99.9 million
03. ☐ $25 - $49.9 million
04. ☐ $20 - $24.9 million
05. ☐ $10 - $19.9 million
06. ☐ $5 - $9.9 million
07. ☐ $1 - $4.9 million
08. ☐ $500,000 - $999,999
09. ☐ $499,999 or less
10. ☐ None of the above

11 Estimated gross annual revenues of your entire company/institution: (check one only)

1. ☐ Over $10 billion
2. ☐ $1 to $9.9 billion
3. ☐ $500 to $999.9 million
4. ☐ $100 to $499.9 million
5. ☐ $50 to $99.9 million
6. ☐ $10 to $49.9 million
7. ☐ $5 to $9.9 million
8. ☐ $4.9 million or less
9. ☐ None of the above

12 Estimated number of employees: At This Location/In Entire Organization

At This Location:
1. ☐ Over 10,000
2. ☐ 5,000 - 9,999
3. ☐ 2,500 - 4,999
4 ☐ 1,000 - 2,499
5. ☐ 500 - 999
6. ☐ 499 or less

Entire Organization:
1. ☐ Over 10,000
2. ☐ 5,000 - 9,999
3. ☐ 2,500 - 4,999
4. ☐ 1,000 - 2,499
5. ☐ 500 - 999
6. ☐ 499 or less

5DB95

▼ PLEASE FOLD HERE THIRD AND SEAL WITH TAPE, NOT STAPLES ▼

▲ PLEASE FOLD HERE SECOND ▲

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Thank you